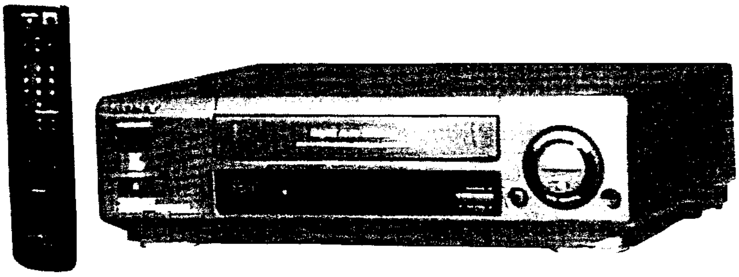
V19618

SLV-X315MJ/X535MJ

RMT-V181B/RMT-V181E

SERVICE MANUAL

E Model
Tourist Model



VHS

H MECHANISM

Differences Manual

- The model SLV-X315MJ is almost same as the model SLV-X315ME.
- The model SLV-X535MJ is almost same as the model SLV-X425ME (electrically) SLV-X515ME (machanically).

V19617

- The model SLV-X535MJ has the NTSC recording function (the same as the model SLV-X425ME) that the model SLV-X515ME doesn't have.
- Therefore, this manual contains only the points which differ from the model SLV-X315ME/X425ME/X515ME.
- For the informations not contained in this manual, please refer to the SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA service manual (9-973-850-11).

VIDEO CASSETTE RECORDER

SONY®

MICROFILM

- **DIFFERENT SPECIFICATIONS LIST**

MODEL	SLV-X315		SLV-X425	SLV-X515	X535
SPECIFICATIONS	ME	MJ	ME	ME	MJ
VIDEO HEADS	2 HEADS		2 HEADS	4 HEADS	4 HEADS
VIDEO SYSTEM					
NTSC 3.58 (REC/PB)	× / ×		○ / ○	× / ×	○ / ○
NTSC 4.43 (REC/PB)	× / ○		○ / ○	× / ○	○ / ○
NTSC ON PAL TV	○		○	○	○
PAL (REC/PB)	○ / ○		○ / ○	○ / ○	○ / ○
SECAM (REC/PB)	× / ×		× / ×	× / ×	× / ×
MESECAM (REC/PB)	○ / ○		○ / ○	○ / ○	○ / ○
RECORD MODE NTSC	×		SP	×	SP/EP
PAL	SP		SP	SP/LP	SP/LP
PLAY MODE NTSC	SP		SP	SP/LP/EP	SP/LP/EP
PAL	SP		SP	SP/LP	SP/LP
BROARDCASTING SYSTEM	BG/DK		BG/DK	BG/DK	BG/DK
FREQUENCY COVERAGE VHF	E2 TO E12		E2 TO E12	E2 TO E12	E2 TO E12
UHF	E21 TO E69		E21 TO E69	E21 TO E69	E21 TO E69
CATV	S01 TO S05, S1 TO S41		S01 TO S05, S1 TO S41	S01 TO S05, S1 TO S41	S01 TO S05,S1 TO S41
RF MOD SYSTEM	G/K		G/K	G/K	G/K
G-CODE SYSTEM	×		×	×	×
POWER REQUIREMENTS	110-240V AC 50/60Hz		110-240V AC 50/60Hz	110-240V AC 50/60Hz	110-240VAC 50/60Hz
POWER CONSUMPTION	19W		19W	19W	19W
REMOTE COMMANDER	RMT-V181E		RMT-V181E	RMT-V181B	RMT-V181B

1. DIFFERENT PARTS LIST

1-1. MECHANICAL PARTS

1-1-1. SLV-X315MJ MODEL

- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

		Model	SLV-X315ME	SLV-X315MJ
Page	Ref. No.	Description	Part No.	Part No.
5-1-1. FRONT PANEL ASSY				
5-1	2	PANEL ASSY, FRONT	X-3945-709-1	X-3946-261-1
	5	SW-269 BOARD, COMPLETE	*A-6794-149-A	*A-6794-226-A
	7	CASE, UPPER	*3-966-843-41	*3-966-843-61
5-1-2. MAIN CHASSIS ASSEMBLY				
5-2	52	PLATE, BOTTOM	3-966-839-01	3-966-839-11
	57	MA-249 BOARD, COMPLETE	*A-6782-879-A	*A-6791-008-A
	63	RP-196 BOARD, COMPLETE	*A-6782-878-A	*A-6791-007-A
	64	PLATE, JACK (L), REAR	*3-966-837-41	*3-966-837-71
ACCESSORIES AND PACKING MATERIALS				
5-12		MANUAL, INSTRUCTION (ENGLISH)	3-810-182-11	3-810-182-51
		MANUAL, INSTRUCTION (ARABIC)	3-810-182-31	3-810-182-61
		CUSHION	*3-967-169-01	*3-970-435-01
		INDIVIDUAL CARTON	*3-967-582-11	*3-970-549-11

1-1-2. SLV-X535MJ MODEL

		Model	SLV-X515ME	SLV-X535MJ
Page	Ref. No.	Description	Part No.	Part No.
5-1-1. FRONT PANEL ASSY				
5-1	2	PANEL ASSY, FRONT	X-3945-707-1	X-3946-251-1
	7	CASE, UPPER	*3-966-843-41	*3-966-843-61
	13	RING, SHUTTLE	3-966-886-01	3-966-886-41
5-1-2. MAIN CHASSIS ASSEMBLY				
5-2	52	PLATE, BOTTOM	3-966-839-01	3-966-839-11
	57	MA-249 BOARD, COMPLETE	*A-6782-875-A	*A-6791-009-A
	63	RP-196 BOARD, COMPLETE	*A-6782-876-A	*A-6791-010-A
	64	PLATE, JACK (L), REAR	*3-966-837-41	*3-966-837-71
ACCESSORIES AND PACKING MATERIALS				
5-12		MANUAL, INSTRUCTION (ENGLISH)	3-810-299-11	3-810-299-51
		MANUAL, INSTRUCTION (ARABIC)	3-810-299-31	3-810-299-41
		CUSHION	*3-967-169-01	*3-970-435-01
		INDIVIDUAL CARTON	*3-968-029-41	*3-970-549-01

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1-2. ELECTRICAL PARTS

1-2-1. SLV-X315MJ MODEL

Model			SLV-X315ME	SLV-X315MJ	Schematic diagram	
Board Name	Ref. No.	Description	Part No.	Part No.	Page	Location
MA-249		MA-249 BOARD, COMPLETE	*A-6782-879-A	*A-6791-008-A		
	C529	ELECT, NONPOLAR 1uF 20% 50V	1-124-499-11	—	4-13	C-10
	C529	ELECT 10uF 20% 16V	—	1-107-714-11		
	IC501	IC M37775M5H322GP	8-759-391-36	—	4-14	F-20
	IC501	IC M37775M5H324GP	—	8-759-397-09		
	R215	METAL CHIP 4.7K 5% 1/10W	1-216-065-00	—	4-12	C-19
	R215	METAL GLAZE 7.5K 5% 1/10W	—	1-216-070-00		
	R527	METAL CHIP 680K 5% 1/10W	1-216-117-00	—	4-13	C-12
	R527	METAL GLAZE 820K 5% 1/10W	—	1-216-119-00		

1-2-2. SLV-X535MJ MODEL

Model			SLV-X515ME	SLV-X535MJ	Schematic diagram	
Board Name	Ref. No.	Description	Part No.	Part No.	Page	Location
MA-249		MA-249 BOARD, COMPLETE	*A-6782-875-A	*A-6791-009-A		
	C206*1	CERAMIC CHIP 0.001uF 5% 50V	—	1-163-141-00	4-12	I-15
	C222*1	CERAMIC CHIP 12PF 5% 50V	—	1-163-229-11	4-11	E-9
	C529	ELECT, NONPOLAR 1uF 20% 50V	1-124-499-11	—	4-13	C-10
	C529	ELECT 10uF 20% 16V	—	1-107-714-11		
	IC201	IC YC MODULE, 3 (PAL)	1-801-153-11	—	4-12	G-14
	IC201*1	IC YC MODULE, 3 (MULTI)	—	1-801-168-11		
	IC501	IC M37775M5H322GP	8-759-391-36	—	4-14	F-20
	IC501	IC M37775M5H324GP	—	8-759-397-09		
	JR539*1	CONDUCTOR, CHIP (2012)	—	1-216-295-00	4-14	J-21
	L204*1	INDUCTOR 27uH	—	1-410-514-11	4-12	I-15
	Q216*1	TRANSISTOR UN2213	—	8-729-421-19	4-11	E-9
	R215	METAL CHIP 4.7K 5% 1/10W	1-216-065-00	—	4-12	C-18
	R215	METAL GLAZE 7.5K 5% 1/10W	—	1-216-070-00		
	R217*1	CONDUCTOR, CHIP (2012)	1-216-295-91	—	4-12	E-15
	R218*1	CONDUCTOR, CHIP (2012)	—	1-216-295-00	4-12	E-15
	R271*1	CONDUCTOR, CHIP (2012)	1-216-295-91	—	4-12	H-15
	R272*1	METAL CHIP 6.8K 5% 1/10W	—	1-216-069-00	4-12	I-15
	R310	METAL CHIP 22K 5% 1/10W	1-216-081-00	—	4-17	F-5
	R310*1	METAL CHIP 18K 5% 1/10W	—	1-216-079-00		
	R313	METAL CHIP 27K 5% 1/10W	1-216-083-00	—	4-17	F-5
	R313*1	METAL CHIP 47K 5% 1/10W	—	1-216-089-91		
	R316	METAL CHIP 6.8K 5% 1/10W	1-216-069-00	—	4-17	H-6
	R316*1	METAL CHIP 8.2K 5% 1/10W	—	1-216-071-00		
	R318	METAL CHIP 10K 5% 1/10W	1-216-073-00	—	4-17	H-6
	R318*1	METAL CHIP 8.2K 5% 1/10W	—	1-216-071-00		
	R515	METAL CHIP 3.3K 5% 1/10W	1-216-061-00	—	4-14	D-21
	R515	METAL GLAZE 68K 5% 1/10W	—	1-216-093-00		
	R527	METAL CHIP 680K 5% 1/10W	1-216-117-00	—	4-13	C-12
	R527	METAL GLAZE 820K 5% 1/10W	—	1-216-119-00		
	R597*1	METAL CHIP 15K 5% 1/10W	—	1-216-077-00	4-14	D-27
	S513*1	SWITCH, SLIDE (COLOR SYSTEM)	1-762-211-11	1-762-207-11	4-14	B-27
	JW535*1	WIRE, TINNING COPPER	—	Mount	4-13	F-6
	JW590*1	WIRE, TINNING COPPER	—	Mount	4-14	C-27

*1: The same as the model SLV-X425ME

English
96D1612-1
Printed in Japan

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Published by Quality Engineering Dept.
(Osaki East)

Sony Corporation
Home A&V Products Company

SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA
RMT-V181B/V181C/V181D/V181E/V181F/V181G

SERVICE MANUAL

V19617

VHS

- **Refer to the SERVICE MANUAL of VHS MECHANICAL ADJUSTMENTS IV for MECHANICAL ADJUSTMENTS. (9-973-623-11)** V03056 #201183

ME Model
SLV-X315ME/X425ME/X515ME
PS Model
SLV-X315PS/X425PS/X515PS
SG Model
SLV-X315SG/X515SG
Australian Model
SLV-X325AS/X525AS
New Zealand Model
SLV-X325NZ/X525NZ
South African Model
SLV-X325SA/X525SA
African Model
SLV-X335AF

H MECHANISM

SPECIFICATIONS

System

Channel coverage
See next page.

RF output signal
UHF channels 30 to 39

Aerial out
75-ohm asymmetrical aerial socket

Inputs and outputs

LINE IN
VIDEO IN, phono jack (1)
Input signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO IN, phono jack (1)
Input level: 327 mVrms
Input impedance: more than 47 kilohms

LINE OUT
VIDEO OUT, phono jack (1)
Output signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO OUT, phono jack (1)
Standard output: 327 mVrms
Load impedance: 47 kilohms
Output impedance: less than 10 kilohms

General

Power requirements
220 – 240 V AC, 50 Hz

Power consumption
19 W (max.)

Operating temperature
5°C to 40°C (41°F to 104°F)

Storage temperature
–20°C to 60°C (–4°F to 140°F)

Dimensions
Approx. 355 × 102 × 278 mm (w/h/d) (Approx. 14 × 4 1/8 × 11 inches) including projecting parts and controls

Mass
Approx. 4.0 kg (8 lb 13 oz)

Supplied accessories

Remote commander (1)
R6 (size AA) batteries (2)
Aerial cable (1)
Mains lead (1)

Design and specifications are subject to change without notice.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

VIDEO CASSETTE RECORDER

SONY®

MICROFILM

- **DIFFERENT SPECIFICATIONS LIST**

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<tr><td colspan="2">SPECIFICATIONS</td><td>ME</td><td>PS</td><td>SG</td><td>AS</td><td>NZ</td><td>SA</td><td>AF</td></tr>
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<tr><td colspan="2">NTSC 4.43 (REC/PB)</td><td colspan="3">x/o</td><td colspan="2">x/o</td><td>x/x</td><td>x/x</td></tr>
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<tr><td rowspan="2">RECORD MODE</td><td>NTSC</td><td colspan="3">x</td><td colspan="3">x</td><td>x</td></tr>
<tr><td>PAL</td><td colspan="3">SP</td><td colspan="3">SP</td><td>SP</td></tr>
<tr><td rowspan="2">PLAY MODE</td><td>NTSC</td><td colspan="3">SP</td><td colspan="2">SP</td><td>x</td><td>x</td></tr>
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<tr><td>UHF</td><td colspan="3">E21 TO E69</td><td>AS28 TO AS69</td><td colspan="2">E21 TO E69</td><td>E21 TO E69</td></tr>
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<tr><td colspan="2">POWER REQUIREMENTS</td><td colspan="3">110-240V AC
50/60Hz</td><td colspan="2">220-240V AC
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<tr><td colspan="2">POWER CONSUMPTION</td><td colspan="3">19W</td><td colspan="3">19W</td><td>19W</td></tr>
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</table>

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer.

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, through functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replace-ment.
5. Check the B+ voltage to see it is at the values specified.
6. Flexible Circuit Board Repairing
    - Keep the temperature of the soldering iron around 270°C during repairing.
    - Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
    - Be careful not to apply force on the conductor when soldering or unsoldering.

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1. HOW TO RETURN THE PINCH ROLLER, GUIDE ROLLER AND ELEVATOR CAM TO STOP MODE

1) Remove the VHS MD assembly from the machine. (Refer to section 2-4. Removal.)
2) Rotate the worm gear-1 of the cam motor beneath the MD assembly in the direction arrow Ⓐ using a screw driver tip.

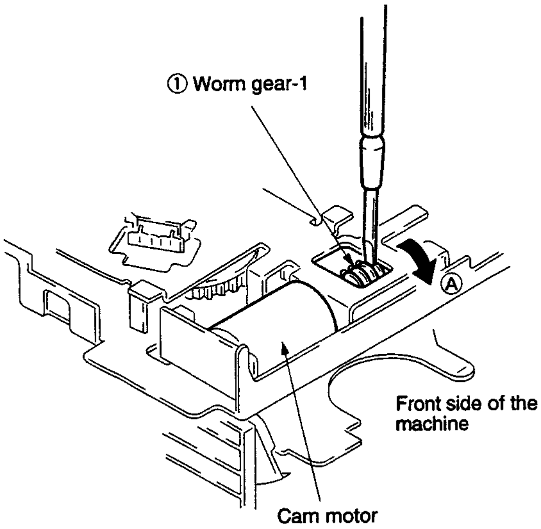

① Worm gear-1
Ⓐ
Front side of the machine
Cam motor

Fig. 1

2. HOW TO RETURN A TAPE INTO CASSETTE HALF

A tape can be rewound into a cassette half by rotating the flywheel-1 of the capstan motor in the direction of Ⓐ with hand.

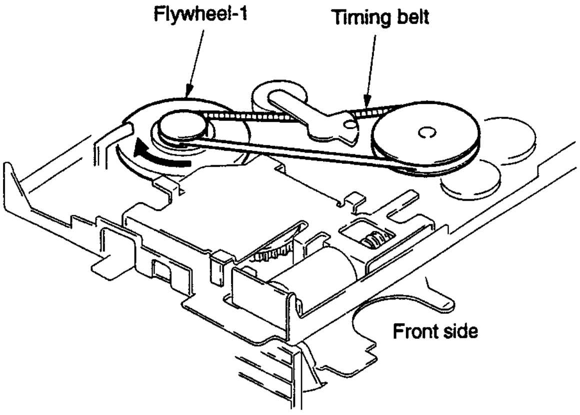

Flywheel-1
Timing belt
Front side

Fig. 2

3. HOW TO REMOVE A CASSETTE FROM A MACHINE IF A CASSETTE IS LEFT IN A MACHINE IN TROUBLE

Execute the section 2, and keep rotating the flywheel-1.

When executing section 1 to 3, take care that a tape slack should not be caught by a mechanism or a tape should not be damaged.

4. HOW TO REMOVE DRUM ASSEMBLY

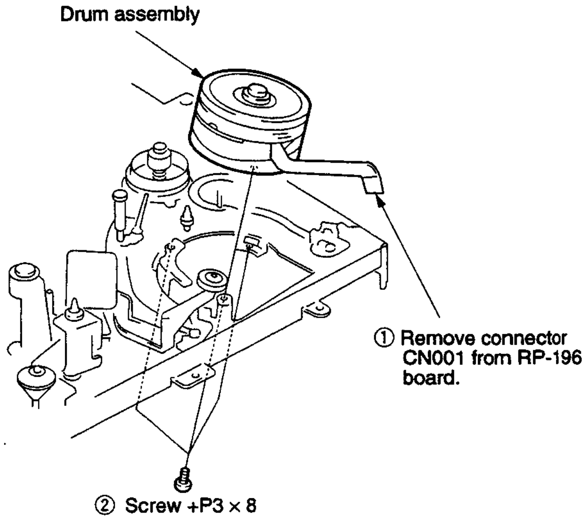

Drum assembly
① Remove connector CN001 from RP-196 board.
② Screw +P3 × 8

Fig. 3

**SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/
X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA**

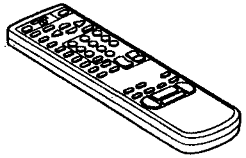
SECTION 1
GENERAL

This section is extracted from the SLV-X525AS/NZ instruction manual.

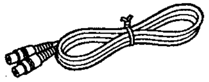
Step 1
Unpacking

Check that you have received the following items with the VCR:

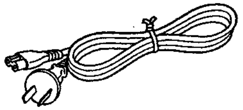
- Remote commander



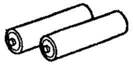
- Aerial cable



- Mains lead



- R6 (size AA) batteries



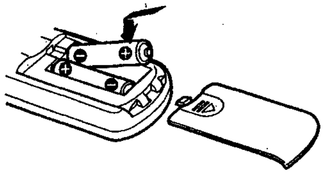
Checking your model name

The instructions in this manual are for the 2 models : SLV-X525AS and X525NZ. Check your model number by looking at the rear panel of your VCR. The X525AS is the model used for illustration purposes. Any difference in operation is clearly indicated in the text, for example, "SLV-X525AS only."

Step 2
Setting up the remote commander

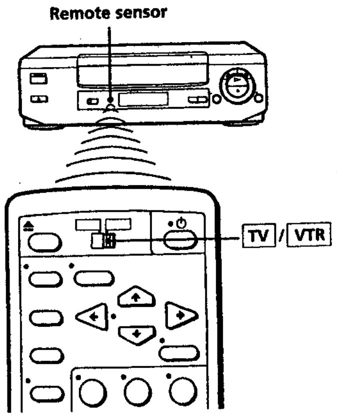
Inserting the batteries

Insert two R6 (size AA) batteries by matching the + and – on the batteries to the diagram inside the battery compartment.



Using the remote commander

You can use this remote commander to operate this VCR and a Sony TV. Buttons on the remote commander marked with a dot (•) can be used to operate your Sony TV.



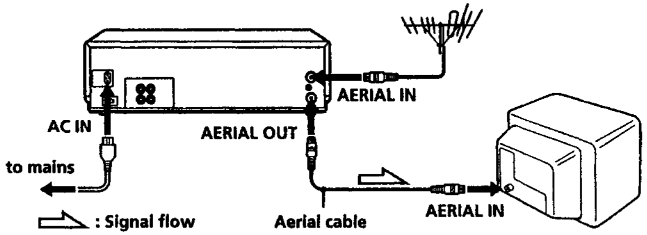
To operate	Set TV/VTR to
the VCR	VTR and point at the remote sensor on the VCR
a Sony TV	TV and point at the remote sensor on the TV

Notes

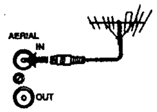
- With normal use, the batteries should last about three to six months.
- If you do not use the remote commander for an extended period of time, remove the batteries to avoid possible damage from battery leakage.
- Do not use a new battery with an old one.
- Do not use different types of batteries.
- The TV / VIDEO button only works when the TV/VTR switch is set to TV.

Step 3

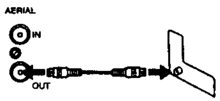
Connecting the VCR


AERIAL IN
AC IN
AERIAL OUT
to mains
: Signal flow
Aerial cable
AERIAL IN

1 Disconnect the aerial input cable from your TV and connect it to AERIAL IN on the rear panel of the VCR.


AERIAL
IN
OUT

2 Connect AERIAL OUT of the VCR and the aerial input of your TV using the supplied aerial cable.

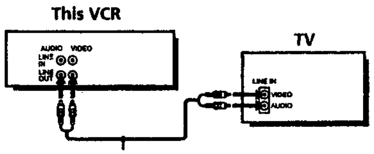

AERIAL
IN
OUT

3 Connect AC IN of the VCR to the mains using the supplied mains lead.

Additional connection

To a TV that has phono type audio/ video input jacks

This additional connection improves picture and sound quality. Connect the TV as shown on the right using a commercially available connecting cable like the Sony VMC-710M/720M. If your TV has left and right audio input jacks, use a connecting cable like the Sony VMC-910MS.

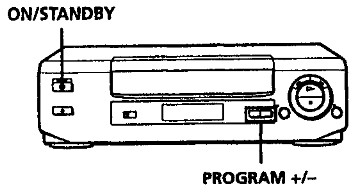

This VCR
TV
AUDIO VIDEO
LINE IN
LINE OUT
LINE IN
VIDEO
AUDIO

VMC-710M/720M audio/video cable (not supplied)

Step 4

Tuning the VCR to your TV

If you have connected your VCR to the TV using the audio/video cable, skip this step.


ON/STANDBY
PROGRAM +/–

1 ON/STANDBY

Press ON/STANDBY to turn on the VCR.

2 – PROGRAM +

Press PROGRAM +/– until "L" appears in the display window.

3 Turn on your TV and select a programme position for video playback.

Choose a channel between UHF 30 and 39 on the TV, where there is no picture and no sound or only a steady rustling sound.

This channel will now be referred to as the video channel.

4 Tune the TV so that a clear blue screen appears on the TV screen.

Refer to your TV manual for tuning instructions.

You have now tuned your TV to the VCR. From now on, whenever you want to play a tape, set the TV to the video channel.

If the blue screen does not appear clearly, see "To obtain a clear blue screen" on page 8.

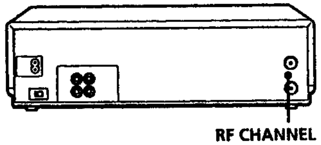
continued

To check to see if the TV tuning is correct

Set the TV to the video channel and press PROGRAM +/– on the VCR. If the TV screen changes to a different programme each time you press PROGRAM +/–, the TV tuning is correct.

To obtain a clear blue screen

If the blue screen does not appear clearly in step 4 above, turn the RF CHANNEL screw at the rear of the VCR with an RF screwdriver to a position where the TV clearly displays the blue screen.



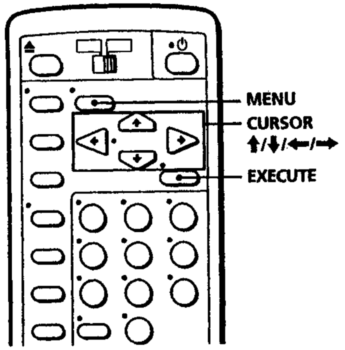
Step 5

Setting the clock

You must set the time and date on the VCR to be able to use the timer recording features properly. You can set the VCR clock using the on-screen display.

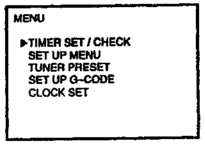
Before you start...

- Turn on the VCR and the TV.
- Set the TV to the video channel.


MENU
CURSOR
↑/↓/←/→
EXECUTE

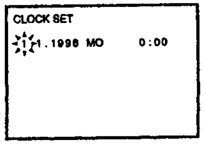
1

Press MENU


MENU
▶TIMER SET / CHECK
SET UP MENU
TUNER PRESET
SET UP G-CODE
CLOCK SET

2

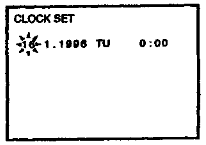
Press CURSOR ↑/↓ to move the cursor (▶) to CLOCK SET, then press EXECUTE.


CLOCK SET
1.1.1996 MO 0:00

3

Press CURSOR ↑/↓ to set the day.

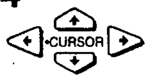
The day of the week is set automatically.


CLOCK SET
16.1.1996 TU 0:00

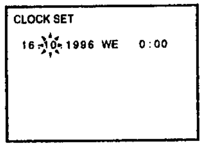
continued

Step 5 : Setting the clock (continued)

4



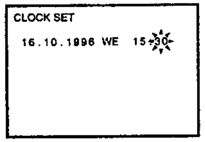
Press CURSOR → to flash the month and set the month using CURSOR ↑/↓.


CLOCK SET

16.10.1996 WE 0:00

5

Set the year, hour and minutes in sequence, using CURSOR → to flash the item to be set, and CURSOR ↑/↓ to select the digits.


CLOCK SET

16.10.1996 WE 15:30

6

Press EXECUTE to start the clock.

Note

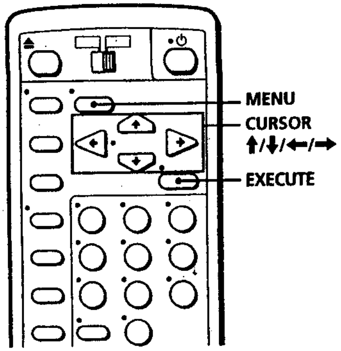
- The menu disappears automatically if you don't proceed for more than a few minutes.

Tip

- To change the digits during setting, press CURSOR ← to return to the item to be changed, and select the digits using CURSOR ↑/↓

Step 6

Tuning the VCR



This VCR is capable of receiving following channels.

(SLV-E525AS)	(SLV-E525NZ)
VHF AS0 to AS12	VHF NZ1 to NZ11
UHF AS28 to AS69	UHF E21 to E69
CATV S1 to S41	CATV S1 to S41
CATV S01 to S05	CATV S1 to S05

First, we recommend that you preset the receivable channels in your area using automatic presetting. Then, if some channels could not be preset automatically, you can preset them manually; if there are any unwanted channels among the preset ones, you can disable the channels.

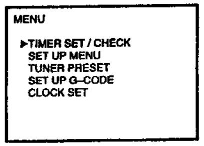
Before you start...

- Turn on the VCR and the TV.
- Set the TV to the video channel.

Presetting all receivable channels automatically

1

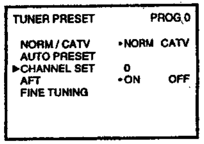
Press MENU.


MENU

▶TIMER SET / CHECK
SET UP MENU
TUNER PRESET
SET UP G–CODE
CLOCK SET

2

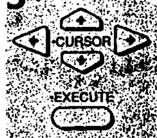
Press CURSOR ↑/↓ to move the cursor (▶) to TUNER PRESET, then press EXECUTE.


TUNER PRESET PROG 0

NORM / CATV •NORM CATV
AUTO PRESET
▶CHANNEL SET 0
AFT •ON OFF
FINE TUNING

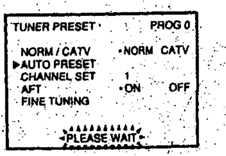
continued

3

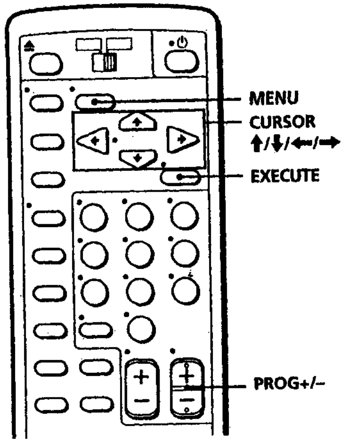


Press CURSOR ↑/↓ to move the cursor (▶) to AUTO PRESET, then press EXECUTE.

All receivable channels are preset in numerical sequence. When no more receivable channels can be found, presetting stops and the picture from the lowest numbered channel is displayed on the TV screen.

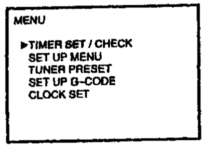

TUNER PRESET PROG 0
NORM / CATV ·NORM CATV
▶AUTO PRESET
CHANNEL SET 1
AFT ·ON OFF
FINE TUNING
PLEASE WAIT

Presetting channels manually

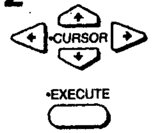


1

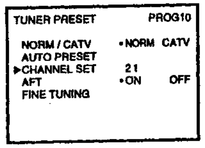
Press MENU.


MENU
▶TIMER SET / CHECK
SET UP MENU
TUNER PRESET
SET UP G-CODE
CLOCK SET

2



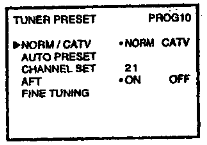
Press CURSOR ↑/↓ to move the cursor (▶) to TUNER PRESET, then press EXECUTE.


TUNER PRESET PROG10
NORM / CATV ·NORM CATV
AUTO PRESET
▶CHANNEL SET 21
AFT ·ON OFF
FINE TUNING

3

Press CURSOR ↑/↓/←/→ to move the cursor (▶) to NORM/CATV, then select NORM.

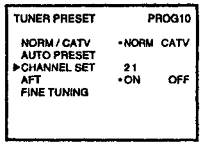
To preset CATV channels, select CATV.


TUNER PRESET PROG10
▶NORM / CATV ·NORM CATV
AUTO PRESET
CHANNEL SET 21
AFT ·ON OFF
FINE TUNING

continued

4

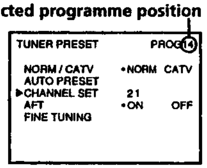
Press CURSOR ↑/↓ to move the cursor (▶) to CHANNEL SET.



```
TUNER PRESET          PROG10

 NORM / CATV      •NORM  CATV
 AUTO PRESET
▶CHANNEL SET       21
 AFT              •ON     OFF
 FINE TUNING
```

5

Press PROG +/– to select the programme position.


Selected programme position

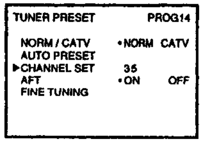
```
TUNER PRESET          PROG14

 NORM / CATV      •NORM  CATV
 AUTO PRESET
▶CHANNEL SET       21
 AFT              •ON     OFF
 FINE TUNING
```

6

Press CURSOR ➡ repeatedly until the channel you want is displayed.

Pressing CURSOR ⬅ goes back to the previous channels.

The channels are scanned in the following order.



```
TUNER PRESET          PROG14

 NORM / CATV      •NORM  CATV
 AUTO PRESET
▶CHANNEL SET       35
 AFT              •ON     OFF
 FINE TUNING
```

(SLV-X525AS)

On-screen channel number	Corresponding TV channel
1	AS1
2	AS2
3	AS3
4	AS4
5	AS5
6	AS6
7	AS7
8	AS8
9	AS9
10	AS10
11	AS11
12	AS12
20	AS0
25	AS5A
26	AS9A
28-69	AS28-69
CATV 1-41	S1-S41
CATV 42-46	S01-S05

(SLV-X525NZ)

On-screen channel number	Corresponding TV channel
1	NZ1
3	NZ2
4	NZ3
5	NZ4
6	NZ5
7	NZ6
8	NZ7
9	NZ8
10	NZ9
11	NZ10
12	NZ11
21-69	E21-E69
CATV 1-41	S1-S41
CATV 42-46	S01-S05

If you know the number of the channel you want, press the programme number buttons. For example, for channel 5, first press "0" and then press "5."

7 To allocate another channel to another programme position, repeat steps 5 and 6.

8

Press EXECUTE.

Disabling unwanted programme positions

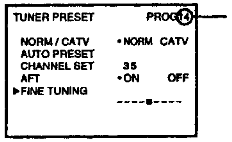
After tuning the TV channels, you can disable unused programme positions. The disabled positions will be skipped later when you press the PROG +/– buttons.

1. Press MENU, then select TUNER PRESET and press EXECUTE.
2. Select CHANNEL SET.
3. Press PROG +/– until the programme position you want to disable appears beside "PROG" on the TV screen.
4. Press programme number button "0" twice to display the number "0" beside CHANNEL SET.
5. Repeat steps 3 and 4 for other positions you want to disable.
6. Press EXECUTE.

If the picture is not clear

Normally, the Auto Fine Tuning (AFT) function automatically tunes in channels clearly. If, however, the picture is not clear, you may also use the manual tuning function.

1. Press PROG +/– to select the programme position for which you cannot obtain a clear picture.
2. Press MENU, then select TUNER PRESET and press EXECUTE.
3. Select FINE TUNING. The fine tuning meter appears.


Selected programme position

```
TUNER PRESET          PROG14

 NORM / CATV      •NORM  CATV
 AUTO PRESET
 CHANNEL SET       35
 AFT              •ON     OFF
▶FINE TUNING
                  ----■-----
```

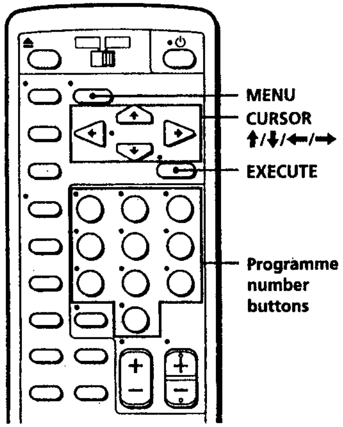
4. Press CURSOR ⬅/➡ to get a clearer picture, then press EXECUTE.
   Note that the AFT (Auto Fine Tuning) setting switches to OFF.

Note

- The menu disappears automatically if you don't proceed for more than a few minutes.

Step 7

Setting up G-CODE



G-CODE is a feature in Sony VCRs that simplifies the task of programming the VCR to make timer recordings. Use the on-screen display to coordinate the programme position of each channel with the guide channel (the number that's assigned to each TV station in advance). To get the guide channel numbers, look in the programme guide for your area that features G-CODE numbers.

- If you want to record satellite broadcasts using G-CODE, see page 18.

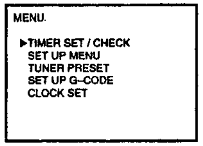
Before you start...

- Turn on the VCR and the TV.
- Set the TV to the video channel.

Setting the guide channels

1 •MENU

Press MENU.

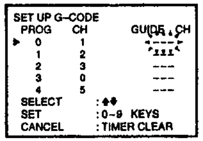


```
MENU
 ▶TIMER SET / CHECK
  SET UP MENU
  TUNER PRESET
  SET UP G-CODE
  CLOCK SET
```

2 •CURSOR •EXECUTE

Press CURSOR ↑/↓ to move the cursor (▶) to SET UP G-CODE, then press EXECUTE.

The preset channels are displayed on the screen and the GUIDE CH column flashes.

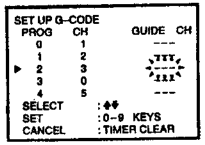


```
SET UP G-CODE
  PROG    CH          GUIDE  CH
▶   0      1             ---
    1      2             ---
    2      3             ---
    3      0             ---
    4      5             ---
  SELECT        : ↑↓
  SET           : 0-9  KEYS
  CANCEL        : TIMER CLEAR
```

3 •CURSOR

Press CURSOR ↑/↓ to move the cursor (▶) to the row on which you want to set the guide channel.

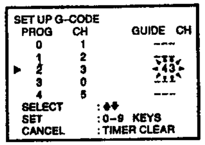
To display other pages for programme positions 5 to 49 (SLV-X525AS) or 6 to 50 (SLV-X525NZ), press CURSOR ↑/↓ repeatedly.



```
SET UP G-CODE
  PROG    CH          GUIDE  CH
    0      1             ---
    1      2             ---
▶   2      3             ---
    3      0             ---
    4      5             ---
  SELECT        : ↑↓
  SET           : 0-9  KEYS
  CANCEL        : TIMER CLEAR
```

4

Press the programme number buttons to enter the guide channel number assigned in the programme guide.



```
SET UP G-CODE
  PROG    CH          GUIDE  CH
    0      1             ---
    1      2             ---
▶   2      3             43
    3      0             ---
    4      5             ---
  SELECT        : ↑↓
  SET           : 0-9  KEYS
  CANCEL        : TIMER CLEAR
```

5

To set the guide channel of another station, repeat steps 3 and 4.

If you want to change the programme positions of the stations, follow the procedures in "Presetting channels manually" on page 13.

6 •EXECUTE

Press EXECUTE.

continued

Setting up G-CODE for satellite broadcasts

When your satellite tuner is connected via the AERIAL IN connector, first you have to set the programme position for each satellite channel using the TUNER PRESET menu. Then set the guide channel number for each satellite channel using the SET UP G-CODE menu.

If your satellite tuner is connected via the LINE IN jacks, you don't have to set programme positions nor guide channel numbers for satellite channels. Skip the following operations.

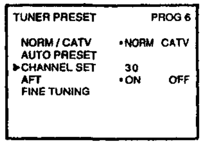
1 Turn on the satellite tuner.

2 Press MENU, then select TUNER PRESET and press EXECUTE.

3 Press PROG +/– to select a programme position you want to use for watching a satellite channel.

4 Select CHANNEL SET, then press CURSOR ➡ to tune the VCR to the satellite tuner.

The channel number displayed beside CHANNEL SET is used for receiving all satellite broadcasts from the satellite tuner.



```
TUNER PRESET                PROG 6

 NORM / CATV          •NORM   CATV
 AUTO PRESET
▶CHANNEL SET           30
 AFT                  •ON      OFF
 FINE TUNING
```

5 Press PROG +/– to select another programme position for another satellite channel, and press the programme number buttons to enter the same channel number as the one displayed in step 4.

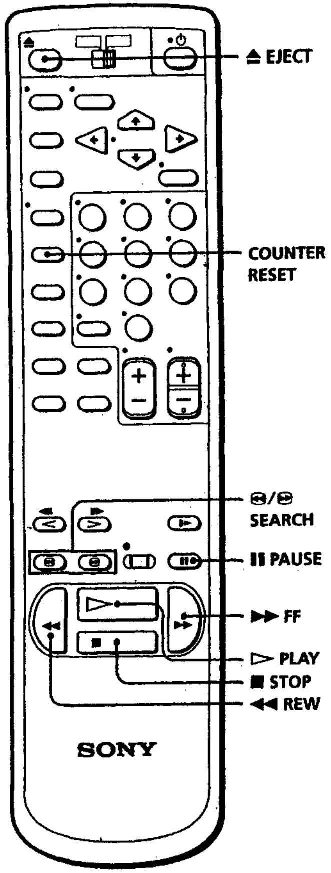
Repeat this step for all satellite channels.

6 Set the guide channel number for each programme position assigned to the satellite channel, following the procedures in "Setting the guide channels" on page 16.

Notes

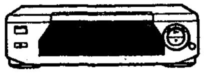
- The menu disappears automatically if you don't proceed for more than a few minutes.
- If you use a satellite tuner connected via the LINE IN jacks, leave the GUIDE CH column blank (—).
- If you inadvertently entered a guide channel number, press TIMER CLEAR.
- The VCR does not allow entering the guide channel number, if the same number has been set.
- When you record a satellite broadcast using G-CODE, you need to select the desired channel on the satellite tuner manually.

Playing a tape



1 Turn on your TV and set it to the video channel.

2 Insert a tape.



The VCR turns on and starts playing automatically if you insert a tape with its safety tab removed.

continued

Playing a tape (continued)

3 ▷PLAY

Press ▷ PLAY.

When the tape reaches the end, it will rewind automatically.

Additional tasks

To	Press
Stop play	■ STOP
Pause play	❚❚ PAUSE
Resume play after pause	❚❚ PAUSE or ▷ PLAY
Search forward	▶▶ FF or ⊕ SEARCH during playback
Search backward	◀◀ REW or ⊕ SEARCH during playback
Fast-forward the tape	▶▶ FF during stop
Rewind the tape	◀◀ REW during stop
Eject the tape	⏏ EJECT

To set the colour system

If streaks appear during playback, set COLOR SYSTEM on the VCR to conform to the system that the tape was recorded in. (The normal setting is AUTO.)

If your tape was recorded in	Set COLOR SYSTEM to
PAL	PAL
NTSC	NTSC

To play an NTSC-recorded tape

Set NTSC PB at the rear of the VCR according to the colour system of your TV.

If your TV is	Set NTSC PB to
PAL	ON PAL TV
NTSC 4.43	NTSC 4.43

To use the time counter

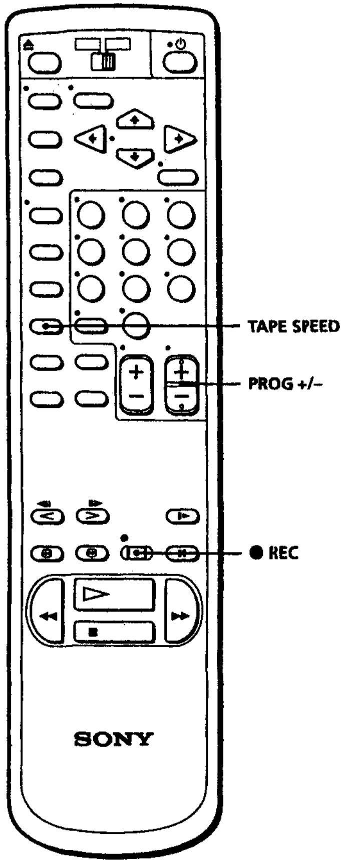
At the point on the tape that you want to find later, press COUNTER RESET. The counter in the display window resets to "0H00M00S." Search for the point afterwards by referring to the counter.

To display the counter on the TV screen, press DISPLAY.

Notes

- The counter resets to "0H00M00S" whenever a tape is reinserted.
- The counter stops counting when it comes to a portion with no recording.
- If a tape has portions recorded in both PAL and NTSC systems, the time counter reading will not be correct. This is due to the difference between the counting cycles of the two video systems.
- Depending on your TV, the following may occur while playing an NTSC-recorded tape:
  - the picture is black and white
  - the picture shakes
  - no picture appears on the TV screen
  - black streaks appear horizontally on the TV screen
  - the colour density increases or decreases.

Recording TV programmes

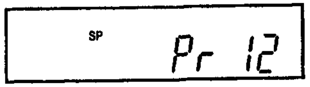


1 Turn on your TV and set it to the video channel.

2 Insert a tape with its safety tab in place.

3 •PROG

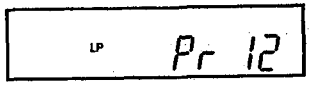
Press PROG +/– to select the programme position you want to record.



4 TAPE SPEED

Press TAPE SPEED to select the tape speed, SP or LP.

LP (Long Play) provides recording time twice as long as SP, however, SP (Standard Play) produces better picture and audio quality.



5 ●REC

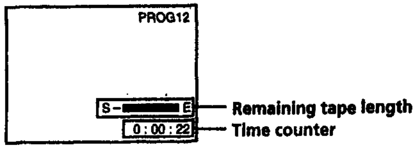
Press ● REC to start recording.

To stop recording

Press ■ STOP.

To check the remaining tape length

Press DISPLAY during playback or recording. The white bar indicates the approximate length of tape remaining.



To watch another TV programme while recording

1. If the TV is connected to the VCR using an audio/video cable, set the TV to TV input. If the TV is connected to the VCR using only the aerial cable, skip this step.
2. Select another programme position on the TV.

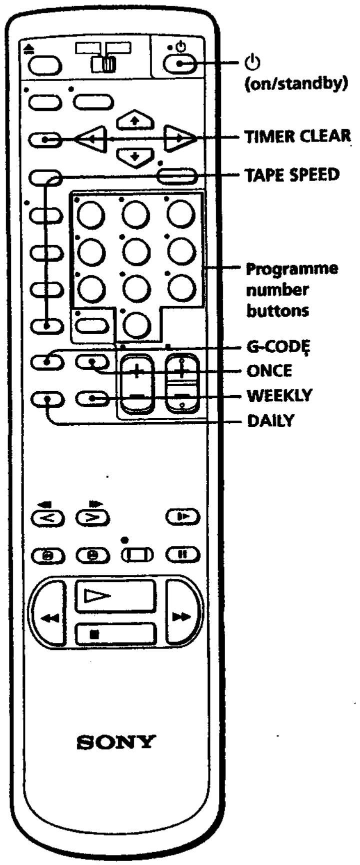
continued

Recording TV programmes using G-CODE

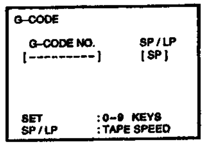
Just enter the programme's G-CODE number listed in the TV programme guide. The date, times and programme position of that programme are set automatically. You can preset up to eight programmes at a time.

Before you start...

- Check that the VCR clock is set to the correct time.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.
- Turn on your TV and set it to the video channel.


⏻
(on/standby)
TIMER CLEAR
TAPE SPEED
Programme number buttons
G-CODE
ONCE
WEEKLY
DAILY
SONY

1 G-CODE Press G-CODE.



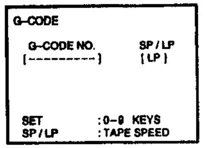
```
G-CODE
  G-CODE NO.            SP / LP
 [----------]           [ SP ]



 SET            : 0-9  KEYS
 SP / LP        : TAPE SPEED
```

continued

Recording TV programmes using G-CODE (continued)

2 TAPE SPEED

Press TAPE SPEED to select SP or LP.

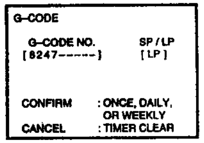


```
G-CODE
  G-CODE NO.            SP / LP
 [----------]           [ LP ]

 SET           : 0-9  KEYS
 SP / LP       : TAPE SPEED
```

3 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪

Press the programme number buttons to enter the programme's G-CODE number.

If you make a mistake, press TIMER CLEAR and re-enter the correct number.

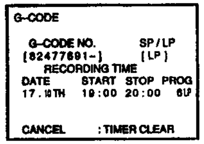


```
G-CODE
  G-CODE NO.            SP / LP
 [8247------]           [ LP ]

 CONFIRM       : ONCE, DAILY,
                 OR WEEKLY
 CANCEL        : TIMER CLEAR
```

4 ONCE or DAILY or WEEKLY

Press ONCE, DAILY or WEEKLY:

To record	Press
Only once	ONCE
Everyday Monday to Friday	DAILY
Once a week	WEEKLY



```
G-CODE
  G-CODE NO.            SP / LP
 [82477691-]            [ LP ]
     RECORDING TIME
 DATE       START  STOP   PROG
 17.10TH    19:00  20:00   6LP

 CANCEL        : TIMER CLEAR
```

The date, start and stop times, programme position, and tape speed appear on the TV screen.

If the information is not correct, press TIMER CLEAR to cancel the setting.

5 To enter another setting, repeat steps 1 to 4.

6 ⏻

Press ⏻ to turn off the VCR.

The TIMER indicator appears in the display window and the VCR stands by for recording.

To stop recording

To stop the VCR while recording, press ■ STOP.

To record satellite broadcasts

If you connect the satellite tuner and the VCR, you can record satellite programmes.

1. Turn on the satellite tuner.
2. On the satellite tuner, select the satellite programme for which you wish to make a timer setting.
3. Repeat the steps described above.
4. Keep the satellite tuner turned on until the VCR finishes recording the satellite programme for which you have made a timer setting.

To use the VCR after setting the timer

To use the VCR before a timer recording begins, just press ⏻. The TIMER indicator turns off and the VCR switches on. Remember to press ⏻ to reset the VCR after using the VCR.

You can also do the following tasks while the VCR is recording:

- Reset the counter.
- Display tape information on the TV screen.
- Check the timer settings.
- Watch another TV programme.

Tip

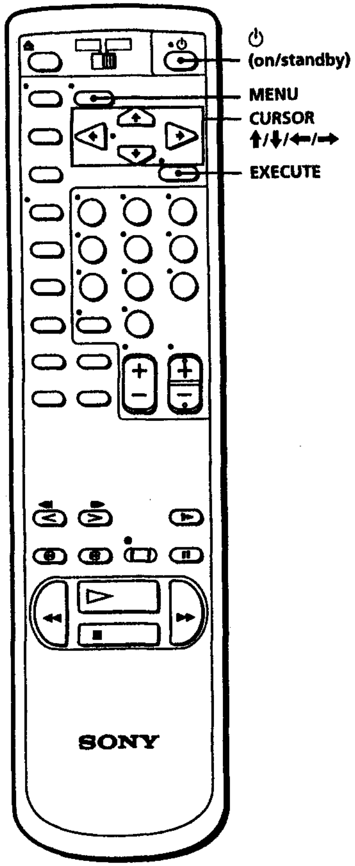
- To cancel the procedure, press G-CODE before pressing ONCE, DAILY or WEEKLY.

Setting the timer manually

If G-CODE is not available in your area, follow the instructions below to set the timer to record programmes.

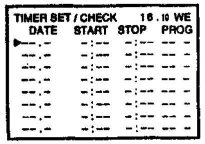
Before you start...

- Check that the VCR clock is set to the correct time.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.
- Turn on your TV and set it to the video channel.



1 •MENU CURSOR •EXECUTE

Press MENU and select TIMER SET/CHECK, then press EXECUTE.



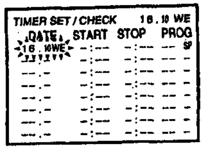
```
TIMER SET / CHECK      16 . 10 WE
  DATE    START  STOP   PROG
▶-- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
```

2 CURSOR

Set the date, start and stop times, programme position, and tape speed:

1. Press CURSOR → to flash each item in turn.
2. Press CURSOR ↑/↓ to set each item.

To correct a setting, press CURSOR ← to return to that setting and reset.



```
TIMER SET / CHECK      16 . 10 WE
  DATE    START  STOP   PROG
 16 . 10WE - : --  - : --  -- SP
          - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
 -- . -   - : --  - : --  -- -
```

To record the same programme every day or the same day every week, press CURSOR ↓ while the date is flashing. For details, see "Daily/weekly recording" below.

To record from a source connected to the LINE IN jacks, press INPUT SELECT to display "L" in the "PROG" position.

3 CURSOR

Press CURSOR → to confirm the setting.

The cursor (▶) appears at the top of the line. To enter another setting, move the cursor to the next line and repeat step 2.

4 •EXECUTE

Press EXECUTE.

5 •⏻

Press ⏻ to turn off the VCR.

The TIMER indicator appears in the display window and the VCR stands by for recording.

To record from other equipment, leave the connected equipment switched on.

To stop recording

To stop the VCR while recording, press ■ STOP.

Daily/weekly recording

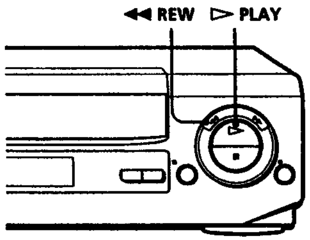
In step 2 above, press CURSOR ↓ to select the recording pattern. Each time you press CURSOR ↓, the indication changes as shown below.

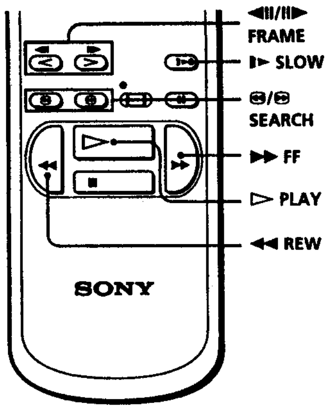
the current date → SU-SA → MO-SA → MO-FR → EVERY SA .....
→ EVERY MO → EVERY SU → 1 month later →(cycles backward)
→ the current date

Tips

- To set the programme position, you can also use the PROG +/– or programme number buttons.
- To set the tape speed, you can also use TAPE SPEED.

Playing/searching at various speeds





Playback options	Operation
Fast-forward/rewind	During stop, press ▶▶ FF or ◀◀ REW.
View the picture during fast-forward or rewind	During fast-forward, hold ▶▶ FF down. During rewind, hold ◀◀ REW down.
Play at high speed	During playback or pause, press ⊕ SEARCH or ⊖ SEARCH. To change direction, press II▶ FRAME or ◀II FRAME.
Play in slow motion	During playback or pause, press I▶ SLOW. To change direction, press II▶ FRAME or ◀II FRAME.
Play frame by frame	During pause, press II▶ FRAME or ◀II FRAME. Hold the button down to play one frame each second.
Play in reverse	During playback, press ◀II FRAME.
Rewind and start play	During stop, hold ◀◀ REW down on the VCR and press ▷ PLAY on the VCR.

To resume normal playback

Press ▷ PLAY.

Tip

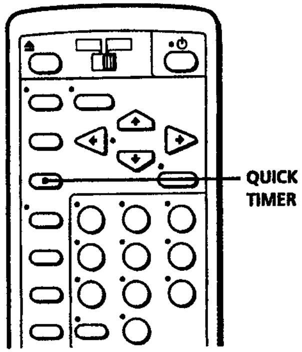
- Adjust the picture using TRACKING ▼/▲ (STILL ADJUST) if:
  - Streaks appear while playing in slow motion.
  - The picture shakes while pausing.

Notes

- The sound is muted during these operations.
- In the LP mode, noise may appear or there may be no colour.
- The picture may have white noise:
  - when playing at high speed in reverse
  - when playing in reverse slow motion
  - when playing in reverse.

Recording TV programmes using the quick timer

After starting recording in the normal way, you can have the VCR stop recording automatically after a specified duration.



1 While recording, press QUICK TIMER once.

2 Press QUICK TIMER repeatedly to set the duration.

Each press advances the time in increments of 30 minutes.

→ 0:00 → 0:30 → 1:00 ----→ 10:30 → 11:00

The duration decreases minute by minute to 0:00, then the VCR stops recording and turns off automatically.

To extend the duration

Press QUICK TIMER repeatedly to set to the new duration.

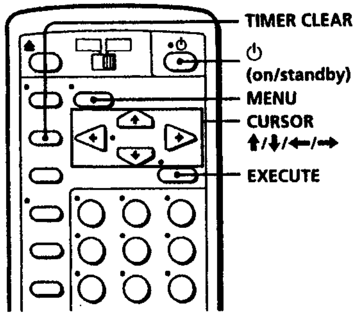
To stop recording

To stop the VCR while recording, press ■ STOP.

Tip

- You can also set the quick timer and start recording during the stop mode.

Checking/ changing/ cancelling timer settings

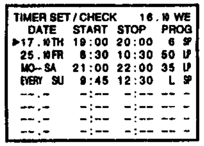


Before you start...

- Turn on your TV and set it to the video channel.

1 Press ⏻ to turn on the VCR.

2 Press MENU and select TIMER SET/CHECK:



```
TIMER SET / CHECK        16 . 10 WE
   DATE     START   STOP    PROG
▶17 . 10TH  19:00   20:00    6  SP
 25 . 10FR   8:30   10:30   50  LP
 MO-SA      21:00   22:00   35  LP
 EVERY  SU   9:45   12:30    L  SP
 -- . -     -:--    -:--    --  -
 -- . -     -:--    -:--    --  -
 -- . -     -:--    -:--    --  -
 -- . -     -:--    -:--    --  -
```

- If you want to change a setting, go on to the next step.
- If you do not need to change the settings, press EXECUTE, then turn off the VCR to return to recording standby.

3 Press CURSOR ↑/↓ to select the setting you want to change or cancel:

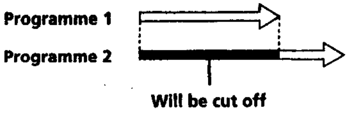
- To change the setting, press CURSOR ←/→ to flash the item you want to change, and press CURSOR ↑/↓ to reset it. Then, press CURSOR → repeatedly until the cursor (▶) appears at the top of the line.
- To cancel the setting, press TIMER CLEAR.

4 Press EXECUTE.

If any settings remain, turn off the VCR to return to recording standby.

When the timer settings overlap

The programme that starts first has priority and the second programme starts recording only after the first programme has finished. If the programmes start at the same time, the programme listed first in the menu has priority.

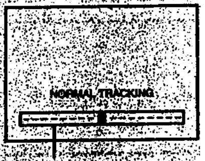


Adjusting the picture

Adjusting the tracking

Although the VCR automatically adjusts the tracking when playing a tape (the AUTO TRACKING indicator flashes in the display window, then lights steadily), distortion may occur if the tape was recorded in poor condition. If so manually adjust the tracking.

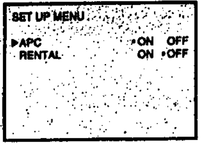
Press TRACKING ▼/▲ (STILL ADJUST) on the VCR to display the tracking meter. The distortion should disappear as you press one of the two buttons. To resume automatic tracking adjustment, eject the tape and reinsert it.



Tracking meter

About Adaptive Picture Control (APC)

Adaptive Picture Control (APC) automatically improves recording and playback quality by adjusting the VCR to the condition of the video heads and tape. To maintain better picture quality, we recommend that you set APC to ON in the SET UP MENU (with the APC indicator in the display window lit).



```
SET UP MENU

▶APC          •ON   OFF
 RENTAL        ON  •OFF
```

APC playback

The APC function automatically works on all types of tapes, including rental tapes and tapes that were not recorded with APC.

APC recording

Whenever you insert a tape and first start recording, the VCR adjusts to the tape using the APC function (the APC indicator flashes rapidly). This adjustment is retained until the tape is ejected.

To deactivate the APC

Press MENU and select SET UP MENU, then set APC to OFF. The APC indicator in the display window goes off.

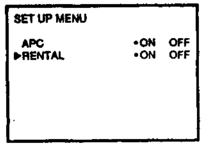
Note

- There is a delay of a few seconds before the VCR actually starts recording while the VCR analyses the tape. To avoid the delay, first set the VCR to recording pause (the APC indicator flashes slowly) and press ● REC to have the VCR analyse the tape. After the APC indicator stops flashing, press ▮▮ PAUSE to start recording immediately. If you press ▮▮ PAUSE before the APC indicator stops flashing, the APC function is cancelled.

continued

Reducing streaks and/or snow

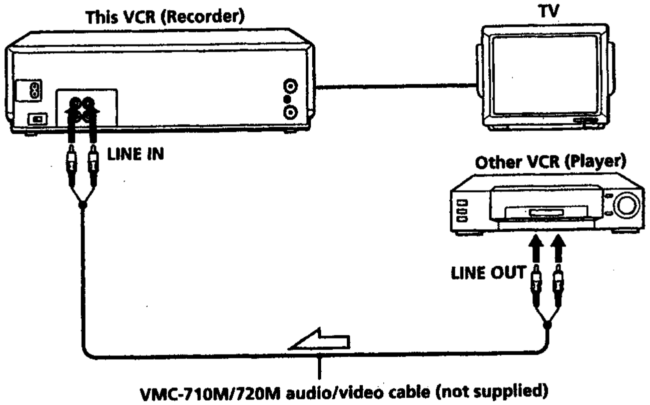
If you are not satisfied with the picture quality while playing a tape, even when the APC is on, try setting RENTAL to ON in the SET UP MENU.



SET UP MENU
APC •ON OFF
▶RENTAL •ON OFF

Editing with another VCR

How to connect to record on this VCR


This VCR (Recorder)
TV
LINE IN
Other VCR (Player)
LINE OUT
VMC-710M/720M audio/video cable (not supplied)

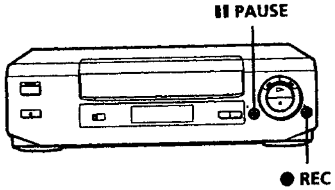
⇦ : Signal flow

Notes

- Make sure you connect the plugs to jacks of the same colour.
- If you connect this VCR to both the LINE IN and LINE OUT jacks of the other VCR, select the input correctly to prevent a humming noise.

continued

Operation (when recording on this VCR)



Before you start editing

- Turn on your TV and set it to the video channel.
- Press INPUT SELECT or PROG +/– to display "L" in the display window.

1. Insert a source tape with its safety tab removed into the other (playback) VCR. Search for the point to start playback and set it to playback pause.
2. Insert a tape with its safety tab in place into this (recording) VCR. Search for the point to start recording and press II PAUSE.
3. Press ● REC on this VCR and set it to recording pause.
4. To start editing, press the II PAUSE buttons on both VCRs at the same time.

To stop editing

Press the ■ STOP buttons on both VCRs.

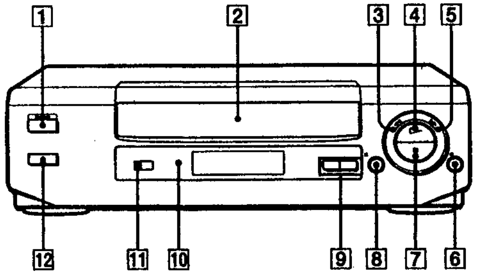
Note

- If you start recording following the procedure above, the VCR won't start recording with the APC function. To record a tape with the APC function, press ● REC again during recording pause in step 3 so that the VCR analyses the tape. Then when you start recording in step 4, press II PAUSE immediately after the APC indicator stops flashing. If you press II PAUSE before the APC indicator stops flashing, the APC function is cancelled.

Index to parts and controls

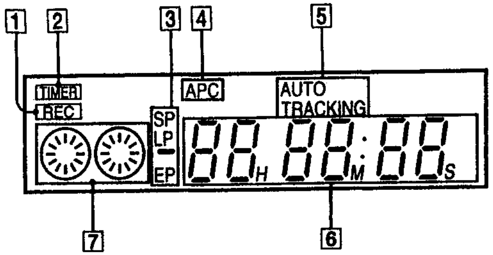
Refer to the pages indicated in parentheses ( ) for details.

Front panel



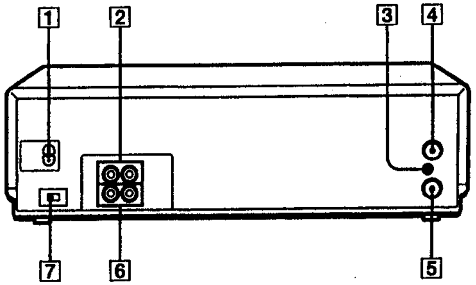
1 ON/STANDBY switch/indicator (7)
2 Tape compartment
3 ◀◀ ⊖ REW button (20, 30)
4 ▷ PLAY button (30)
5 ▶▶ ⊕ FF button (20, 30)
6 ● REC button (36)
7 ■ STOP button (36)
8 ❚❚ PAUSE button (36)
9 PROGRAM +/–/TRACKING ▼/▲ (STILL ADJUST) buttons (7, 30, 33)
10 Remote sensor (5)
11 COLOR SYSTEM switch (20)
12 ⏏ EJECT button (20)

Display window



1 REC (recording) indicator
2 TIMER indicator (26)
3 Tape speed indicator (23)
4 APC indicator (33)
5 AUTO TRACKING indicator (33)
6 Time counter/clock/line/programme position indicator (7, 21, 23)
7 Tape indicator

Rear panel

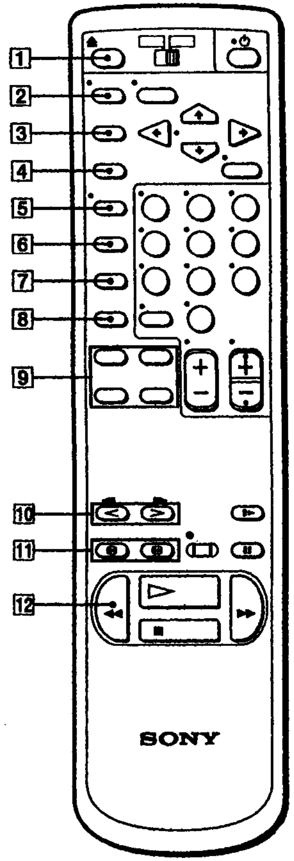


1 AC IN connector (6)
2 LINE IN AUDIO/VIDEO jacks (35)
3 RF CHANNEL screw (8)
4 AERIAL IN connector (6)
5 AERIAL OUT connector (6)
6 LINE OUT AUDIO/VIDEO jacks (6)
7 NTSC PB switch (20)

continued

Index to parts and controls (continued)

Remote commander



1 ⏏ EJECT button (20)

2 TV/VIDEO button (only for a TV) (5)

3 TIMER CLEAR button (26, 32)

4 QUICK TIMER button (31)

5 DISPLAY button (21, 23)

6 COUNTER RESET button (21)

7 INPUT SELECT button (24, 36)

8 TAPE SPEED button (23)

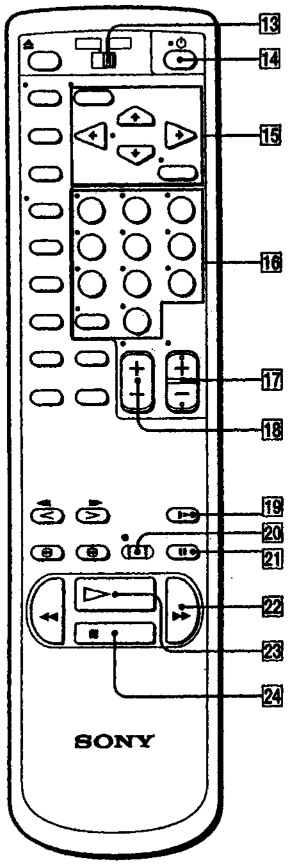
9 G-CODE buttons (25, 26)

G-CODE button
ONCE button
DAILY button
WEEKLY button

10 ◀II/II▶ FRAME buttons (30)

11 ⏪/⏩ SEARCH buttons (20)

12 ◀◀ REW button (20)



13 TV/VTR remote control switch (5)

14 ⏻ (on/standby) switch (29)

15 Menu operation buttons (9)

MENU button
CURSOR ↑/↓/←/→ buttons
EXECUTE button

16 Programme number/ -/-- (ten's digit) buttons (17, 24)

17 PROG +/− buttons (14, 23)

18 VOL +/− buttons

19 I▶ SLOW button (30)

20 ● REC button (23)

21 II PAUSE button (20)

22 ▶▶ FF button (20)

23 ▷ PLAY button (20)

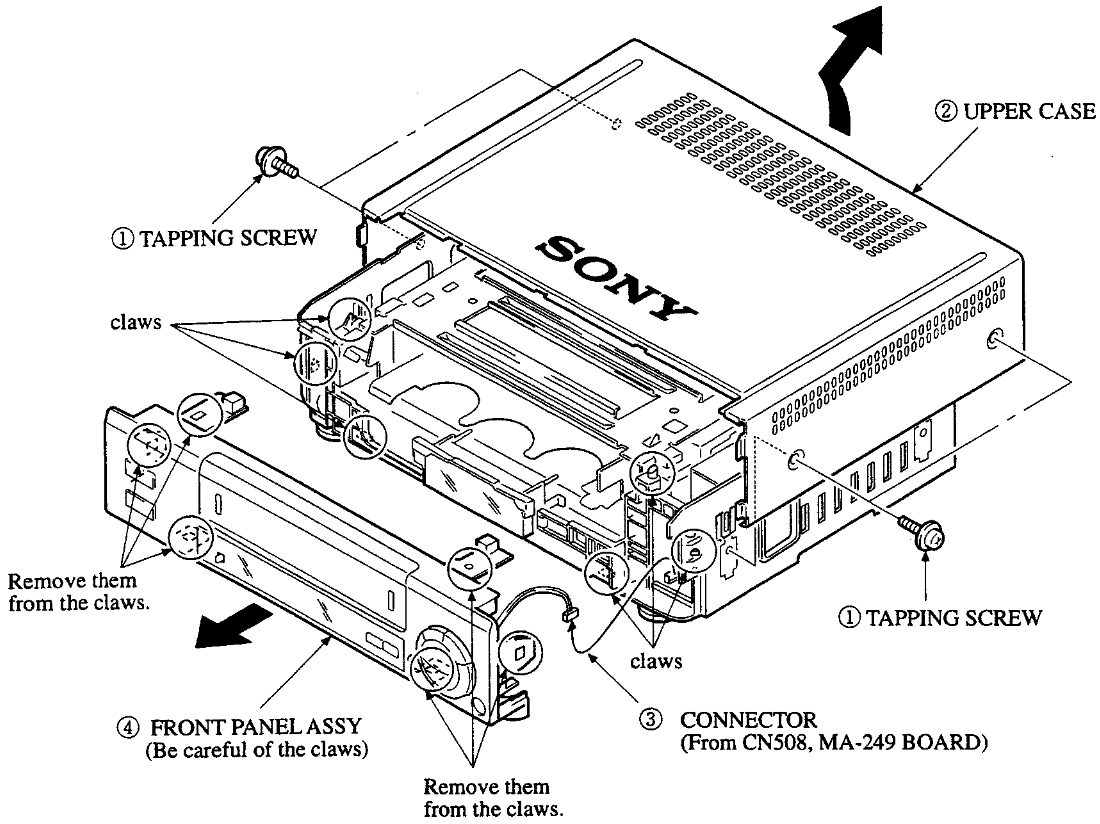
24 ■ STOP button (20)

SECTION 2

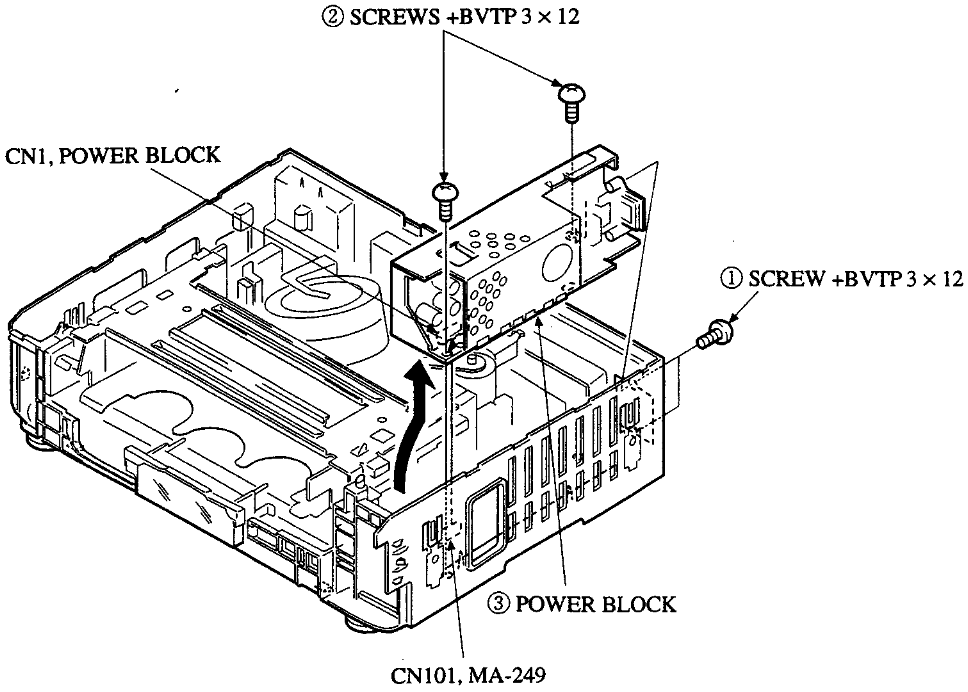
DISASSEMBLY

NOTE : Follow the disassembly procedure in the numerical order given.

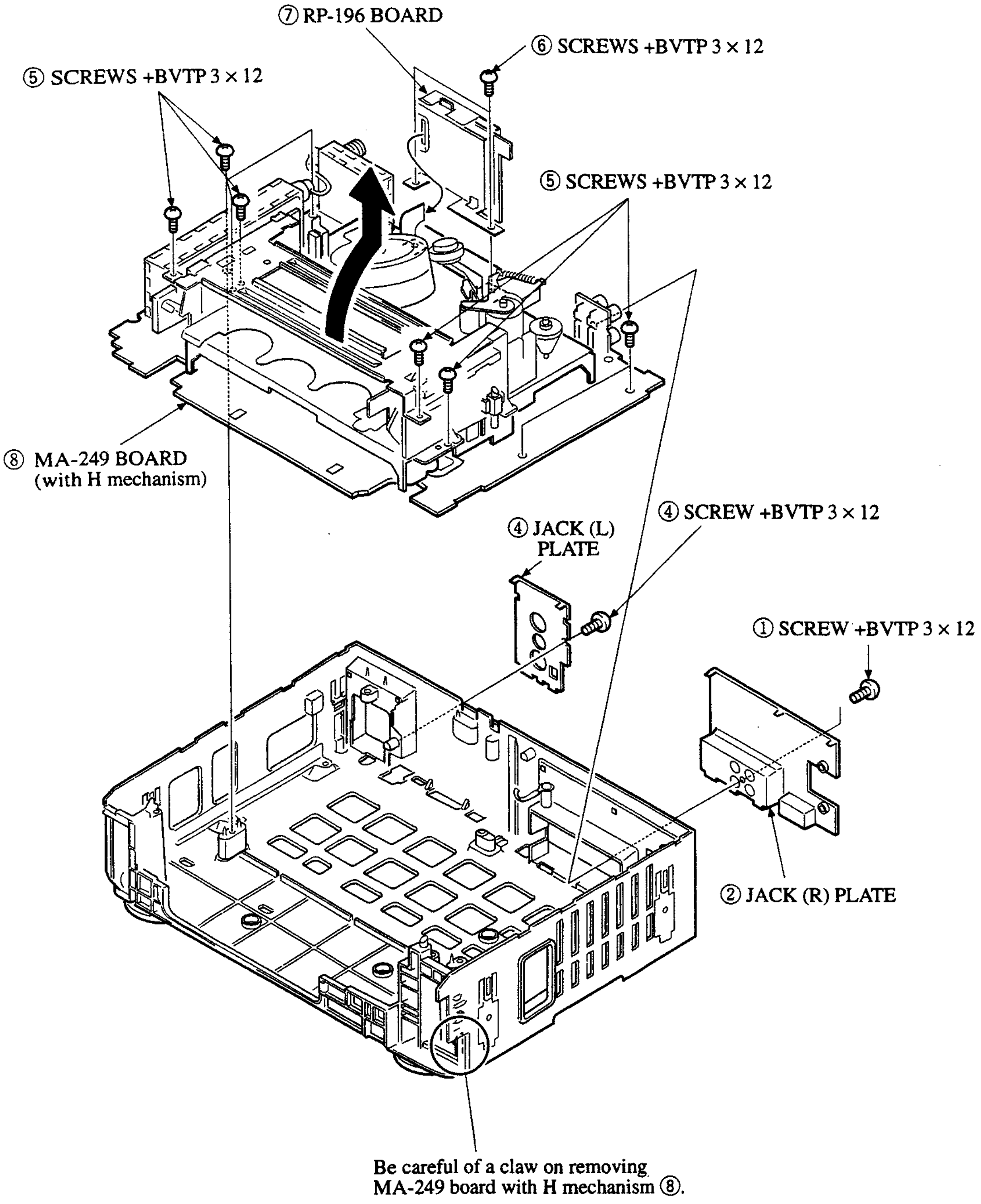
2-1. REMOVAL OF FRONT PANEL ASSY


② UPPER CASE
① TAPPING SCREW
claws
SONY
Remove them from the claws.
① TAPPING SCREW
claws
④ FRONT PANEL ASSY (Be careful of the claws)
③ CONNECTOR (From CN508, MA-249 BOARD)
Remove them from the claws.

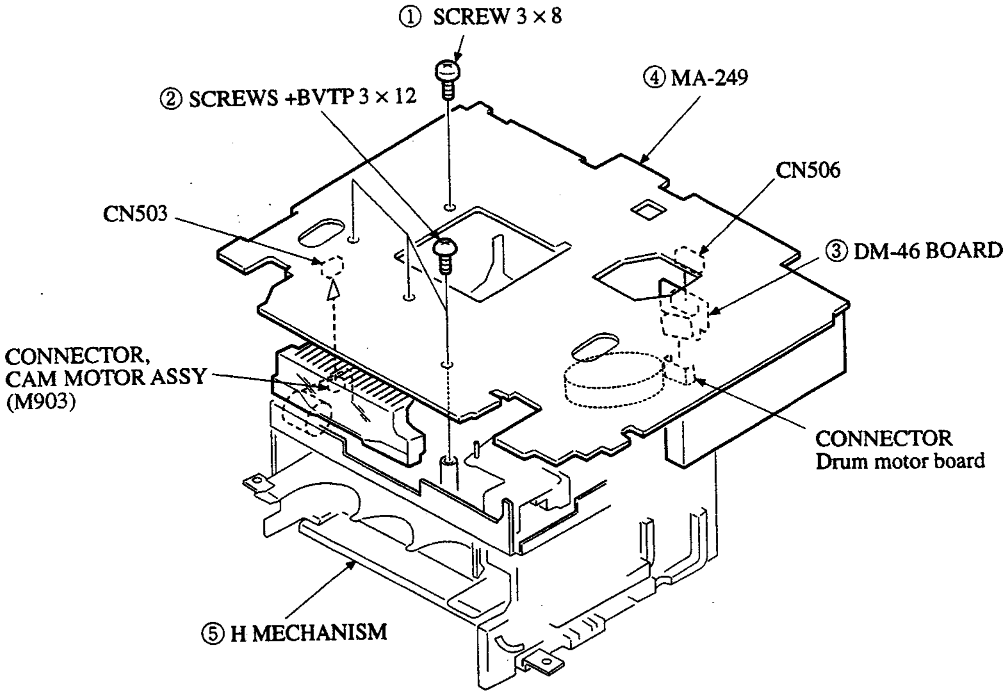
2-2. REMOVAL OF POWER BLOCK


② SCREWS +BVTP 3 × 12
CN1, POWER BLOCK
① SCREW +BVTP 3 × 12
③ POWER BLOCK
CN101, MA-249

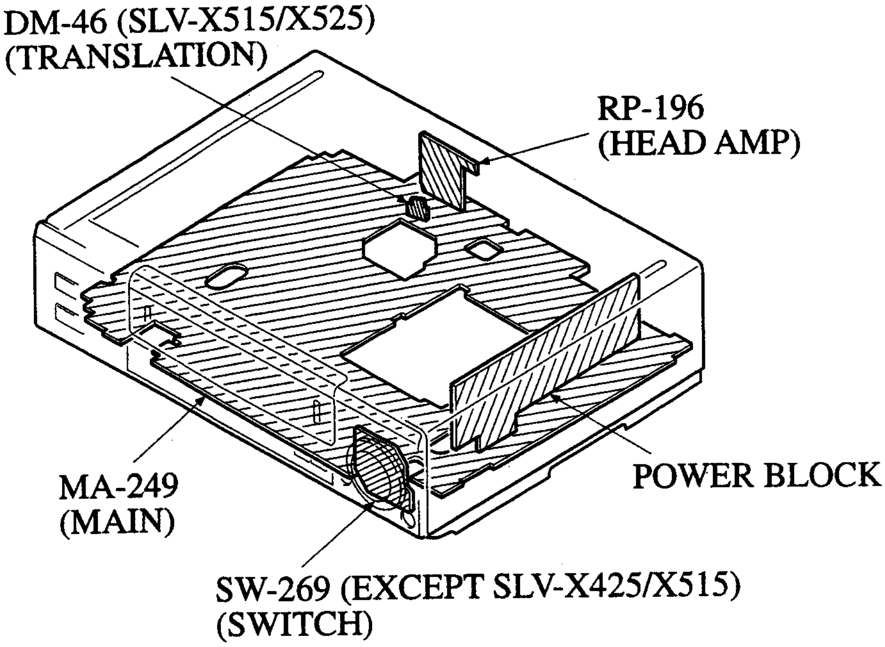
2-3. REMOVAL OF RP-196 BOARD and MA-249 BOARD


⑦ RP-196 BOARD
⑥ SCREWS +BVTP 3 × 12
⑤ SCREWS +BVTP 3 × 12
⑤ SCREWS +BVTP 3 × 12
⑧ MA-249 BOARD (with H mechanism)
④ SCREW +BVTP 3 × 12
④ JACK (L) PLATE
① SCREW +BVTP 3 × 12
② JACK (R) PLATE
Be careful of a claw on removing MA-249 board with H mechanism ⑧.

2-4. REMOVAL OF H MACHANISM

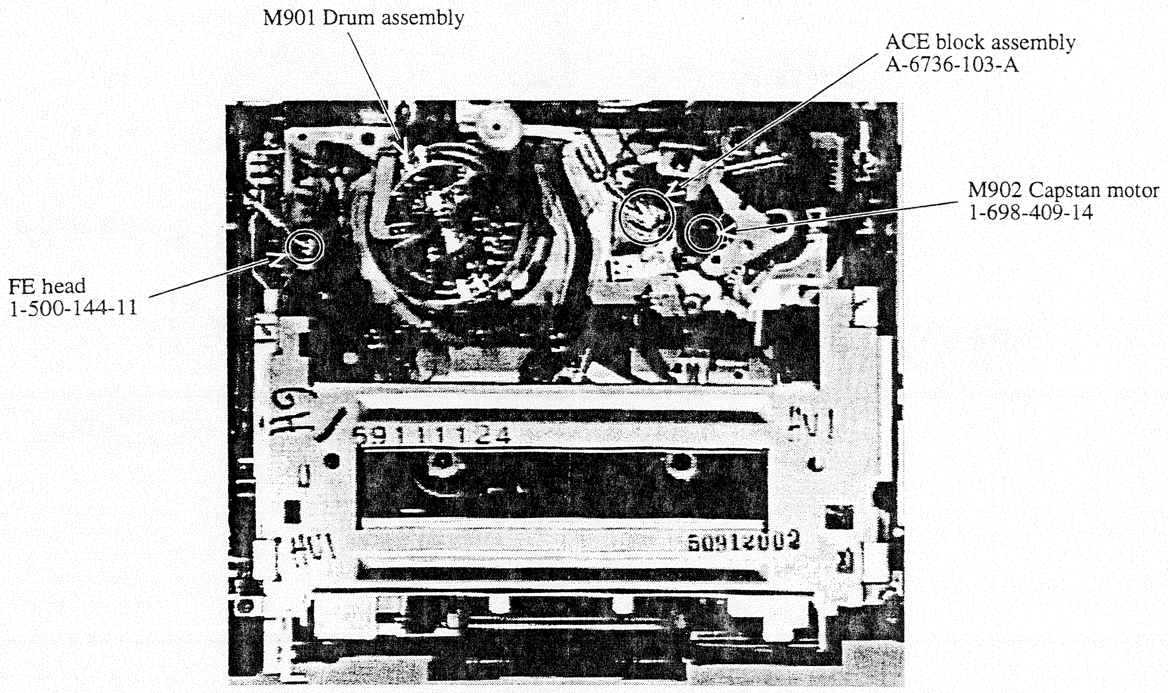

① SCREW 3 × 8
② SCREWS +BVTP 3 × 12
④ MA-249
CN506
CN503
③ DM-46 BOARD
CONNECTOR, CAM MOTOR ASSY (M903)
CONNECTOR Drum motor board
⑤ H MECHANISM

2-5. CIRCUIT BOARDS LOCATION

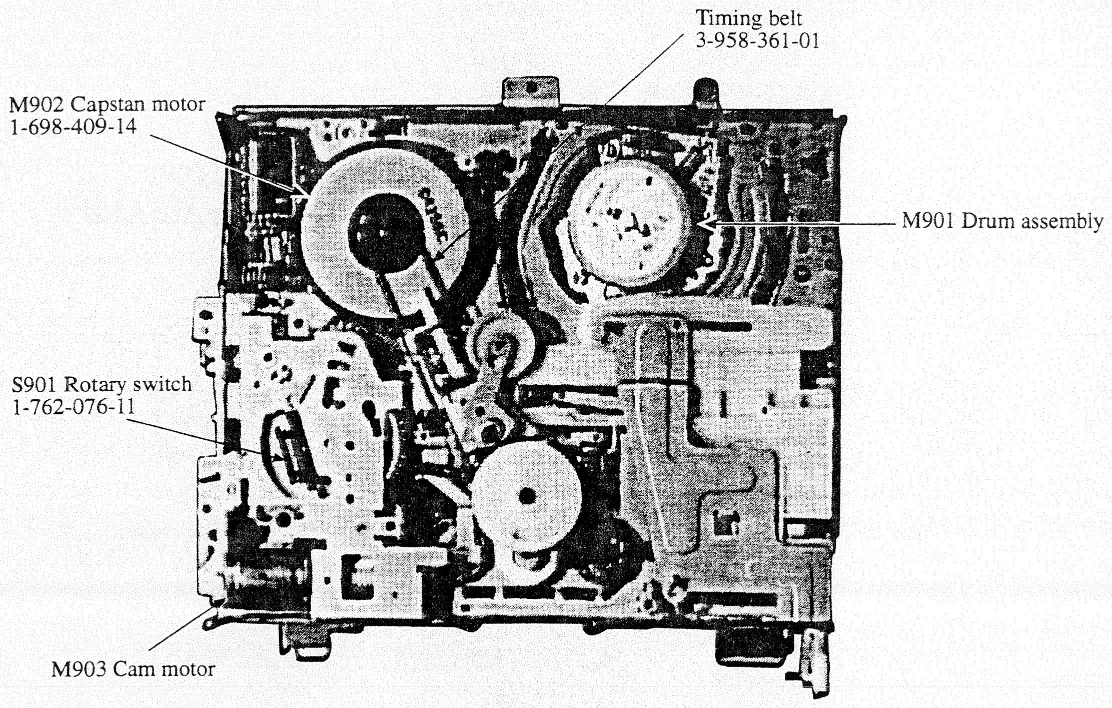

DM-46 (SLV-X515/X525) (TRANSLATION)
RP-196 (HEAD AMP)
MA-249 (MAIN)
POWER BLOCK
SW-269 (EXCEPT SLV-X425/X515) (SWITCH)

2-6. INTERNAL VIEWS

— Top view —

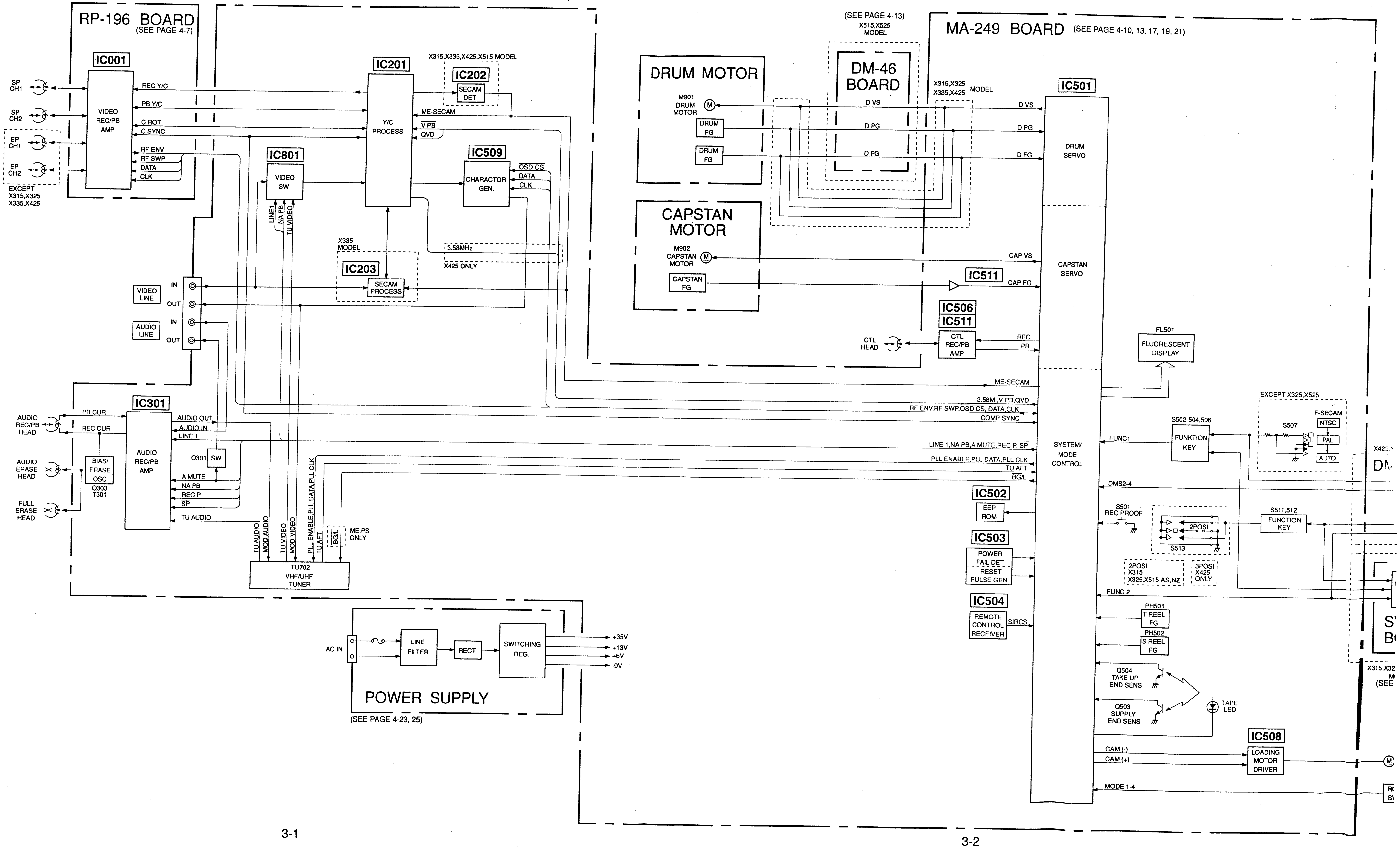

M901 Drum assembly
ACE block assembly
A-6736-103-A
M902 Capstan motor
1-698-409-14
FE head
1-500-144-11

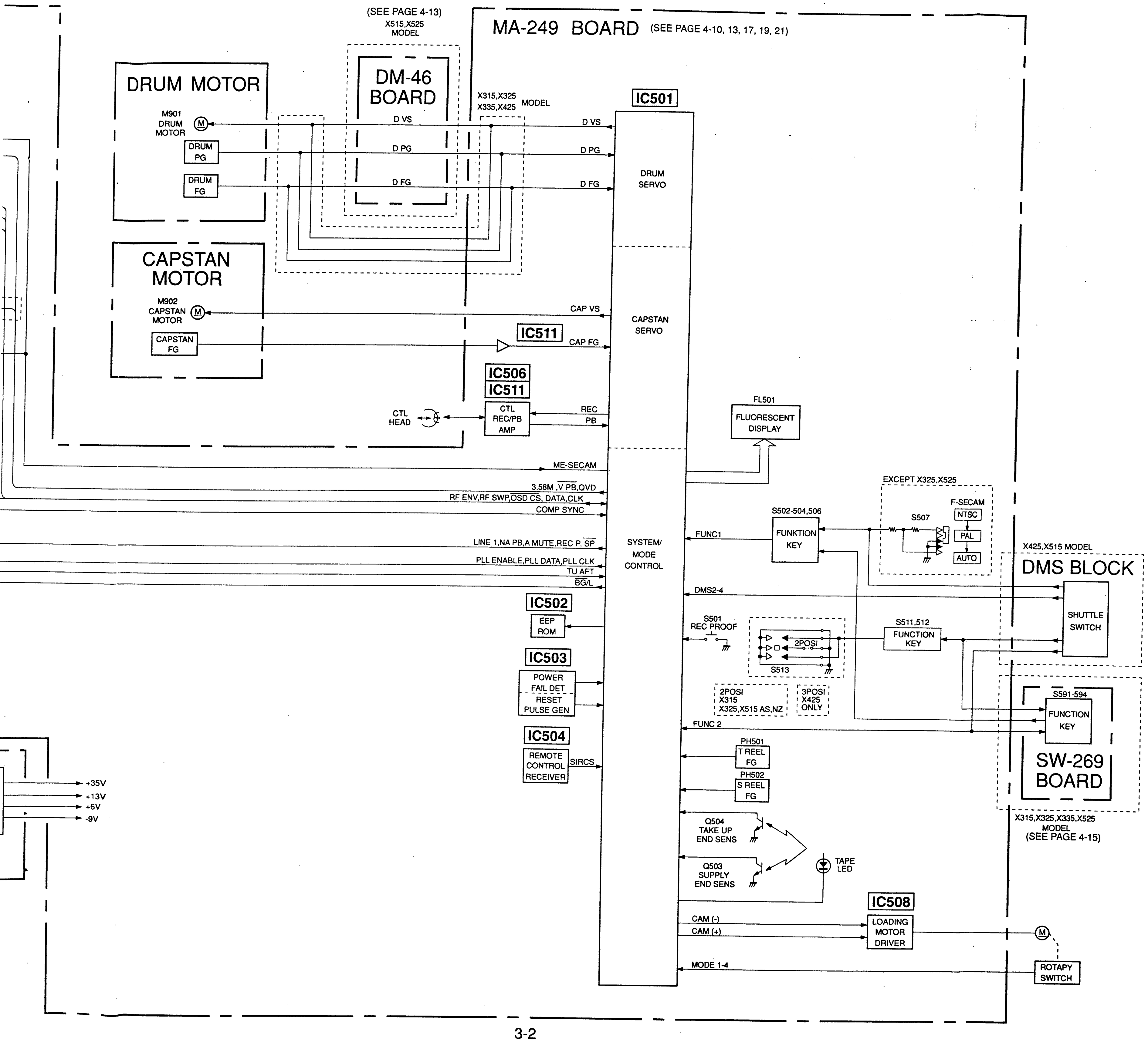
— Bottom view —


Timing belt
3-958-361-01
M902 Capstan motor
1-698-409-14
M901 Drum assembly
S901 Rotary switch
1-762-076-11
M903 Cam motor

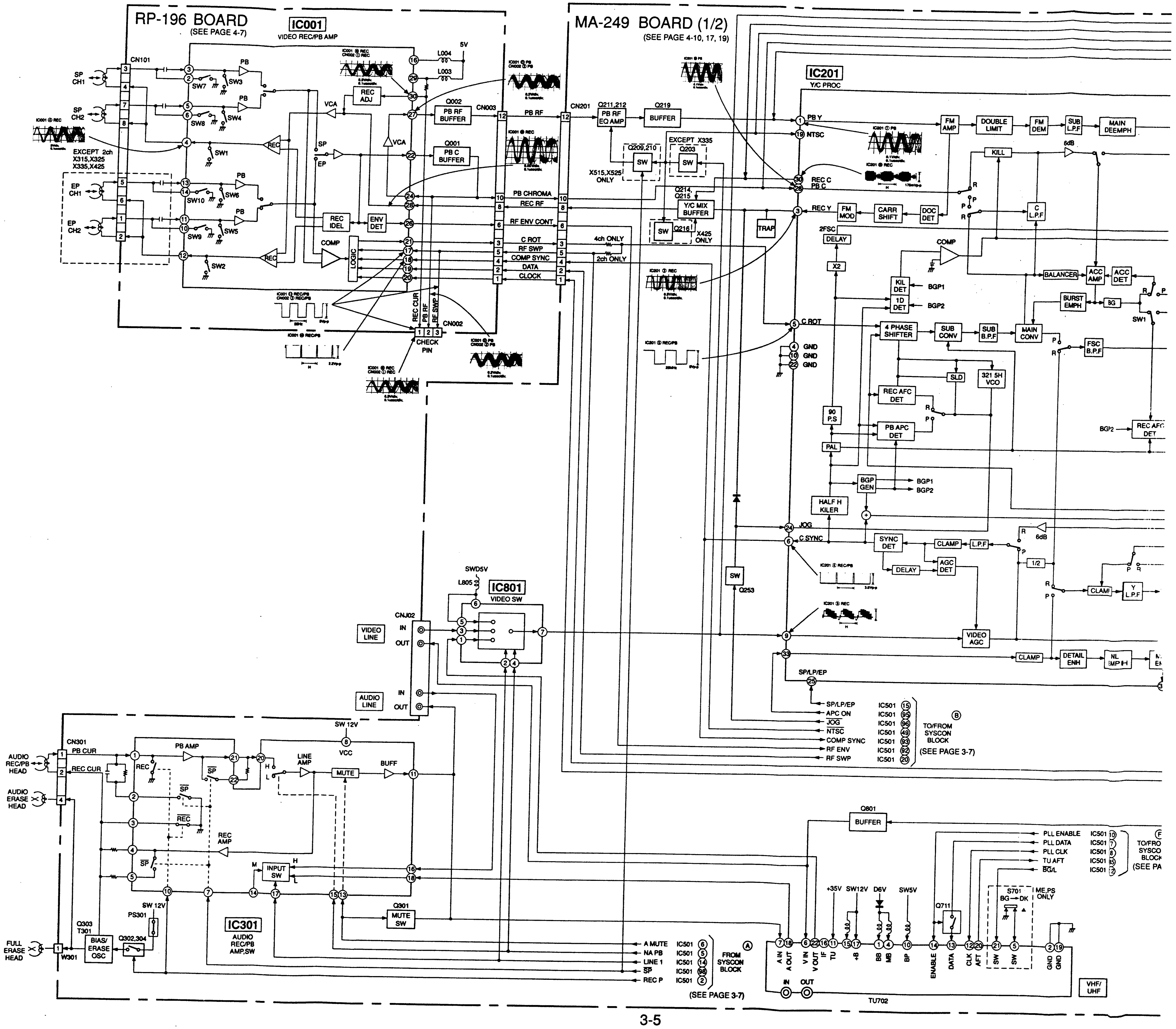
SECTION 3
BLOCK DIAGRAM

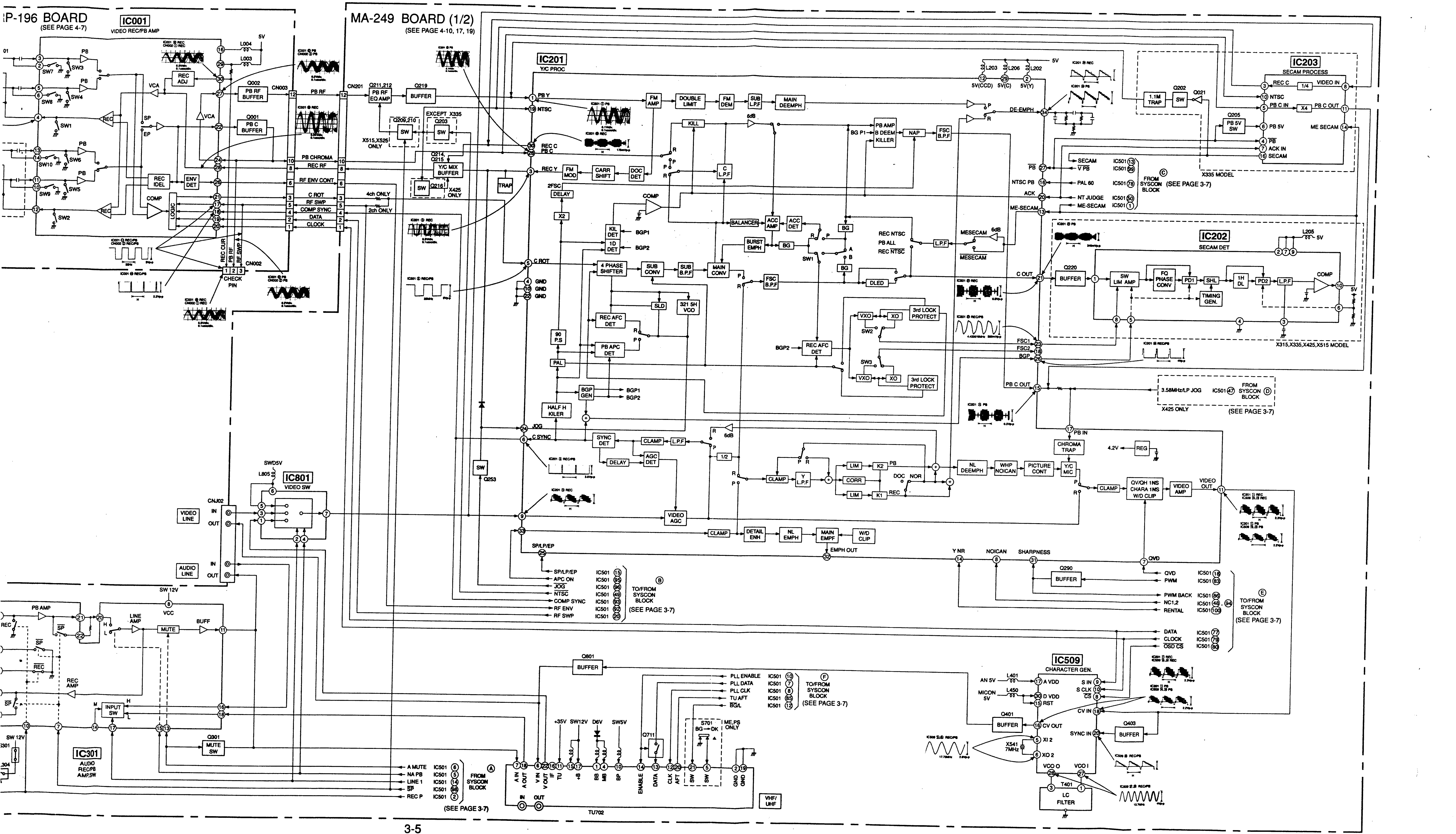
3-1. OVERALL BLOCK DIAGRAM


RP-196 BOARD
(SEE PAGE 4-7)
IC001
VIDEO REC/PB AMP
SP CH1
SP CH2
EP CH1
EP CH2
EXCEPT X315,X325 X335,X425
REC Y/C
PB Y/C
C ROT
C SYNC
RF ENV
RF SWP
DATA
CLK
IC201
Y/C PROCESS
X315,X335,X425,X515 MODEL
IC202
SECAM DET
ME-SECAM
V PB
QVD
IC801
VIDEO SW
LINE1
NA PB
TU VIDEO
IC509
CHARACTOR GEN.
OSD CS
DATA
CLK
X335 MODEL
IC203
SECAM PROCESS
3.58MHz
X425 ONLY
VIDEO LINE
AUDIO LINE
IN
OUT
IC301
AUDIO REC/PB AMP
AUDIO REC/PB HEAD
PB CUR
REC CUR
AUDIO ERASE HEAD
FULL ERASE HEAD
BIAS/ ERASE OSC
Q303 T301
AUDIO OUT
AUDIO IN
LINE 1
Q301
SW
A MUTE
NA PB
REC P
SP
TU AUDIO
TU AUDIO
MOD AUDIO
TU VIDEO
MOD VIDEO
PLL ENABLE,PLL DATA,PLL CLK
TU AFT
BG/L
ME,PS ONLY
TU702 VHF/UHF TUNER
AC IN
LINE FILTER
RECT
SWITCHING REG.
+35V
+13V
+6V
-9V
POWER SUPPLY
(SEE PAGE 4-23, 25)
DRUM MOTOR
M901 DRUM MOTOR
DRUM PG
DRUM FG
(SEE PAGE 4-13)
X515,X525 MODEL
DM-46 BOARD
D VS
D PG
D FG
CAPSTAN MOTOR
M902 CAPSTAN MOTOR
CAPSTAN FG
CAP VS
CAP FG
IC511
IC506
IC511
CTL HEAD
CTL REC/PB AMP
REC
PB
MA-249 BOARD (SEE PAGE 4-10, 13, 17, 19, 21)
X315,X325 X335,X425 MODEL
IC501
DRUM SERVO
CAPSTAN SERVO
SYSTEM/ MODE CONTROL
FL501
FLUORESCENT DISPLAY
ME-SECAM
3.58M ,V PB,QVD
RF ENV,RF SWP,OSD CS, DATA,CLK
COMP SYNC
LINE 1,NA PB,A MUTE,REC P, SP
PLL ENABLE,PLL DATA,PLL CLK
TU AFT
BG/L
EXCEPT X325,X525
F-SECAM
NTSC
PAL
AUTO
S507
S502-504,506
FUNKTION KEY
FUNC1
DMS2-4
IC502
EEP ROM
S501 REC PROOF
2POSI
S513
2POSI X315 X325,X515 AS,NZ
3POSI X425 ONLY
S511,512
FUNCTION KEY
IC503
POWER FAIL DET
RESET PULSE GEN
FUNC 2
IC504
REMOTE CONTROL RECEIVER
SIRCS
PH501 T REEL FG
PH502 S REEL FG
Q504 TAKE UP END SENS
Q503 SUPPLY END SENS
TAPE LED
IC508
LOADING MOTOR DRIVER
CAM (-)
CAM (+)
MODE 1-4
X425
X315,X32

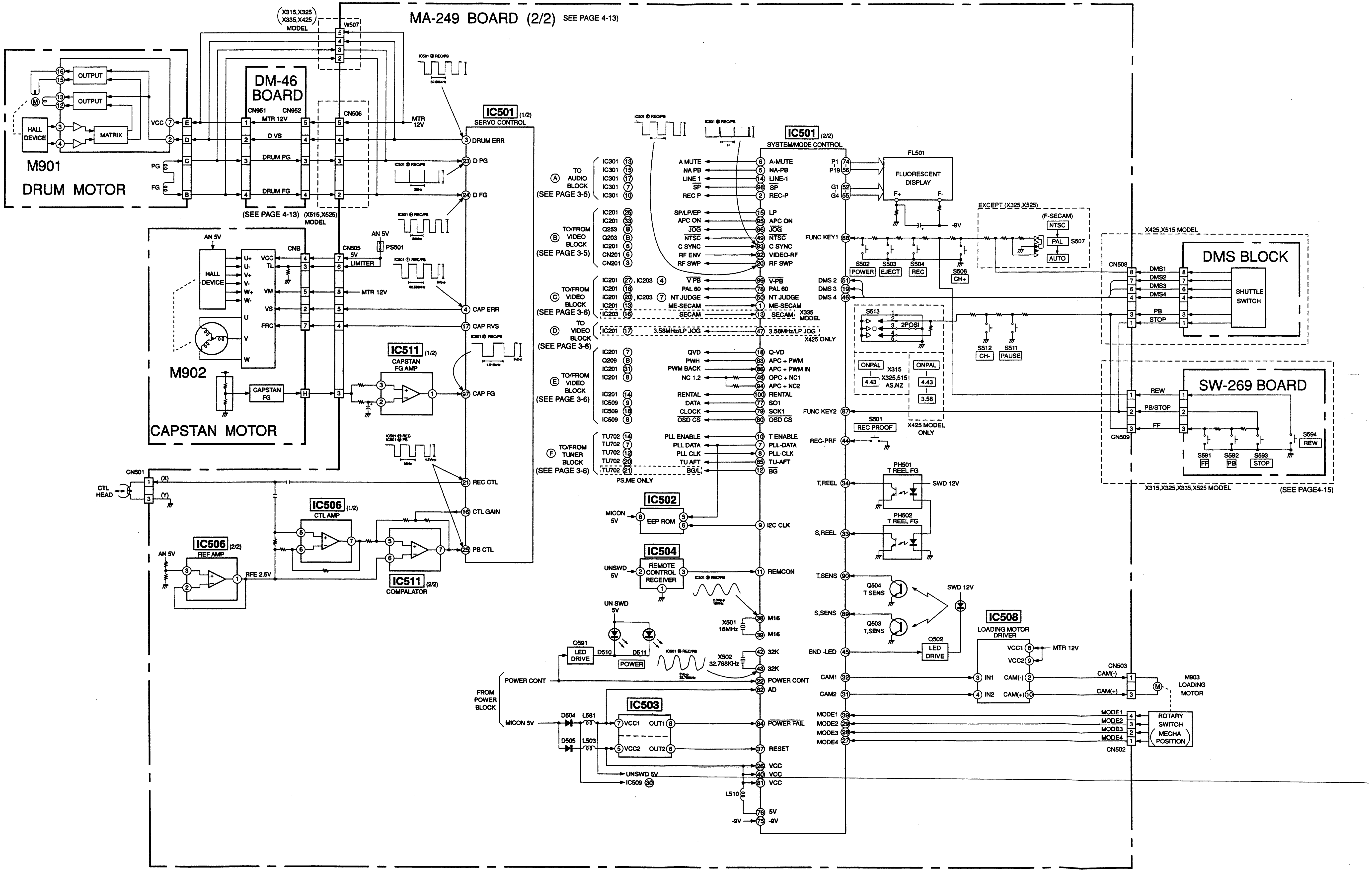

(SEE PAGE 4-13)
X515,X525 MODEL
MA-249 BOARD (SEE PAGE 4-10, 13, 17, 19, 21)
DRUM MOTOR
M901 DRUM MOTOR
DRUM PG
DRUM FG
DM-46 BOARD
X315,X325 X335,X425 MODEL
IC501
D VS
D PG
D FG
DRUM SERVO
CAPSTAN MOTOR
M902 CAPSTAN MOTOR
CAPSTAN FG
CAP VS
IC511
CAP FG
CAPSTAN SERVO
IC506
IC511
CTL HEAD
CTL REC/PB AMP
REC
PB
FL501
FLUORESCENT DISPLAY
ME-SECAM
3.58M ,V PB,QVD
RF ENV,RF SWP,OSD CS, DATA,CLK
COMP SYNC
LINE 1,NA PB,A MUTE,REC P, SP
PLL ENABLE,PLL DATA,PLL CLK
TU AFT
BG/L
SYSTEM/ MODE CONTROL
EXCEPT X325,X525
F-SECAM
NTSC
PAL
AUTO
S507
S502-504,506
FUNKTION KEY
FUNC1
X425,X515 MODEL
DMS BLOCK
DMS2-4
SHUTTLE SWITCH
IC502
EEP ROM
S501 REC PROOF
2POSI
S513
S511,512
FUNCTION KEY
IC503
POWER FAIL DET
RESET PULSE GEN
2POSI X315 X325,X515 AS,NZ
3POSI X425 ONLY
FUNC 2
S591-594
FUNCTION KEY
SW-269 BOARD
X315,X325,X335,X525 MODEL (SEE PAGE 4-15)
IC504
REMOTE CONTROL RECEIVER
SIRCS
PH501
T REEL FG
PH502
S REEL FG
+35V
+13V
+6V
-9V
Q504 TAKE UP END SENS
Q503 SUPPLY END SENS
TAPE LED
IC508
CAM (-)
CAM (+)
LOADING MOTOR DRIVER
MODE 1-4
ROTAPY SWITCH

3-2. VIDEO, AUDIO, TUNER BLOCK DIAGRAM

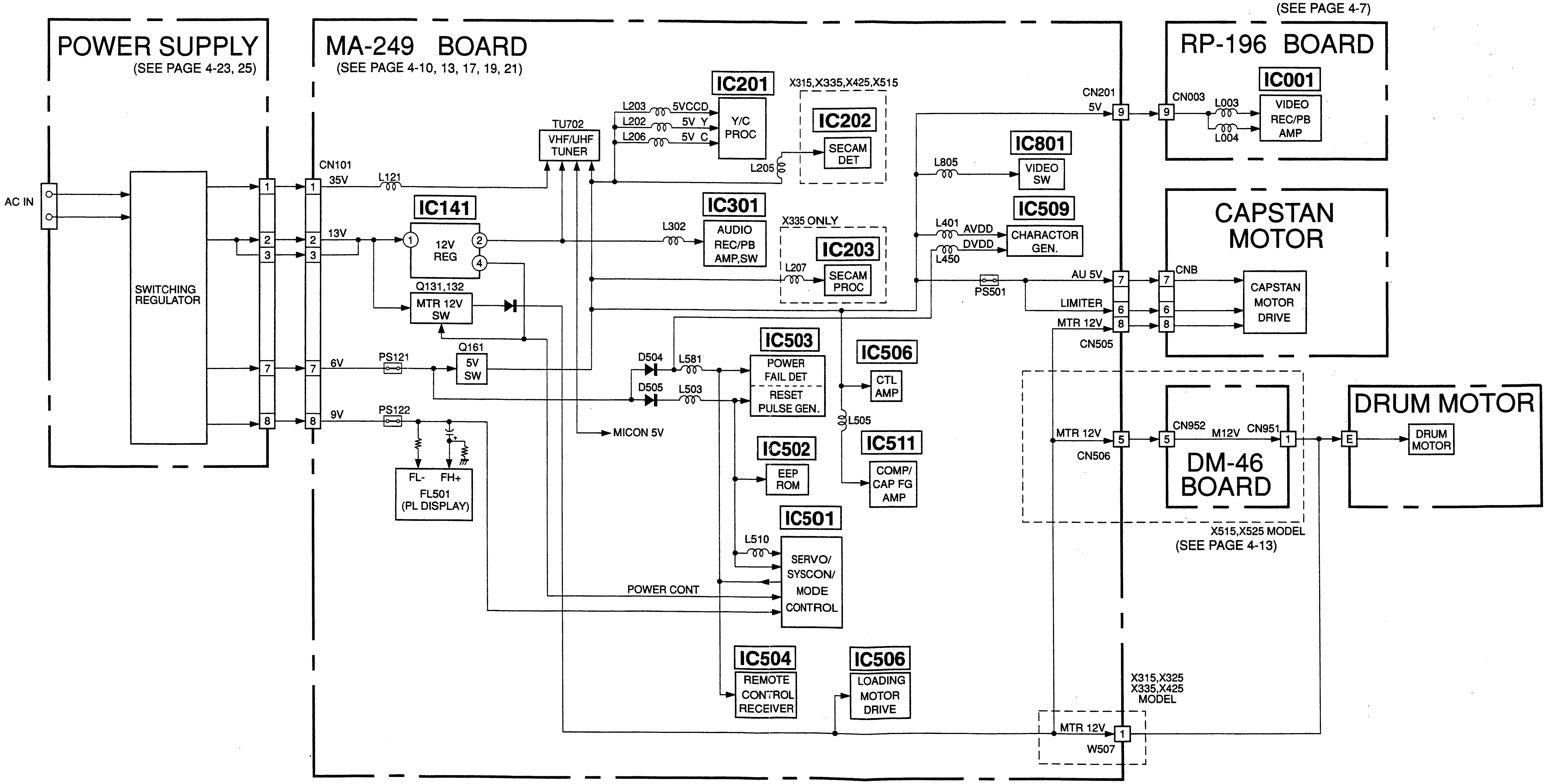

RP-196 BOARD
(SEE PAGE 4-7)
IC001
VIDEO REC/PB AMP
CN101
SP CH1
SP CH2
EXCEPT 2ch X315,X325 X335,X425
EP CH1
EP CH2
SW7
SW3
SW8
SW4
SW1
SW10
SW6
SW9
SW5
SW2
PB
VCA
REC
SP
EP
REC ADJ
REC IDEL
ENV DET
COMP
LOGIC
Q002 PB RF BUFFER
Q001 PB C BUFFER
CN003
L004
L003
5V
PB RF
PB CHROMA
REC RF
RF ENV CONT
C ROT
RF SWP
COMP SYNC
DATA
CLOCK
REC CUR
PB RF
RF SWP
CN002
CHECK PIN
MA-249 BOARD (1/2)
(SEE PAGE 4-10, 17, 19)
CN201
Q211,212 PB RF EQ AMP
Q219 BUFFER
Q209,210 SW
EXCEPT X335
Q203 SW
X515,X525 ONLY
Q214, Q215 Y/C MIX BUFFER
Q216 SW
X425 ONLY
4ch ONLY
2ch ONLY
TRAP
IC201
Y/C PROC
PB Y
NTSC
REC C
PB C
REC Y
FM MOD
CARR SHIFT
DOC DET
FM AMP
DOUBLE LIMIT
FM DEM
SUB L.P.F
MAIN DEEMPH
KILL
6dB
C L.P.F
2FSC
DELAY
X2
KIL DET
1D DET
BGP1
BGP2
COMP
BALANCER
ACC AMP
ACC DET
BURST EMPH
BG
SW1
C ROT
4 PHASE SHIFTER
SUB CONV
SUB B.P.F
MAIN CONV
FSC B.P.F
GND
SLD
321 5H VCO
REC AFC DET
90 P.S
PB APC DET
PAL
BGP GEN
HALF H KILER
REC AFC DET
JOG
C SYNC
SYNC DET
CLAMP
L.P.F
AGC DET
DELAY
1/2
CLAMP
Y L.P.F
SW
Q253
VIDEO AGC
CLAMP
DETAIL ENH
NL EMPH
SP/LP/EP
SWD5V
L805
IC801
VIDEO SW
CNJ02
VIDEO LINE
IN
OUT
AUDIO LINE
SP/LP/EP IC501 (15)
APC ON IC501 (95)
JOG IC501 (96)
NTSC IC501 (49)
COMP SYNC IC501 (93)
RF ENV IC501 (92)
RF SWP IC501 (20)
Ⓑ TO/FROM SYSCON BLOCK (SEE PAGE 3-7)
Q801 BUFFER
PLL ENABLE IC501 (10)
PLL DATA IC501 (7)
PLL CLK IC501 (8)
TU AFT IC501 (53)
BG/L IC501 (52)
TO/FROM SYSCON BLOCK (SEE PA
+35V SW12V D6V SW5V
Q711
S701 BG→DK
ME,PS ONLY
A IN
A OUT
V IN
V OUT
IF
TU
+B
BB
MB
BP
ENABLE
DATA
CLK
AFT
SW
GND
GND
IN OUT
TU702
VHF/UHF
CN301
PB CUR
REC CUR
AUDIO REC/PB HEAD
AUDIO ERASE HEAD
FULL ERASE HEAD
W301
Q303 T301 BIAS/ERASE OSC
Q302,304
PS301
SW 12V
PB AMP
LINE AMP
VCC
BUFF
MUTE
REC AMP
INPUT SW
IC301
AUDIO REC/PB AMP,SW
Q301 MUTE SW
A MUTE IC501 (6)
NA PB IC501 (5)
LINE 1 IC501 (14)
SP IC501 (98)
REC P IC501 (2)
FROM SYSCON BLOCK Ⓐ
(SEE PAGE 3-7)


P-196 BOARD
(SEE PAGE 4-7)
IC001
VIDEO REC/PB AMP
SW7
SW3
SW8
SW4
SW1
SW10
SW6
SW9
SW5
SW2
PB
REC
VCA
SP
EP
REC ADJ
Q002
PB RF BUFFER
Q001
PB C BUFFER
REC IDEL
ENV DET
COMP
LOGIC
L004
L003
5V
CN003
CHECK PIN
REC CUR
PB RF
RF SWP
CN002
MA-249 BOARD (1/2)
(SEE PAGE 4-10, 17, 19)
CN201
PB RF
PB CHROMA
REC RF
RF ENV CONT
C ROT
RF SWP
COMP SYNC
DATA
CLOCK
4ch ONLY
2ch ONLY
Q211,212
PB RF EQ AMP
Q219
BUFFER
Q209,210
SW
EXCEPT X335
Q203
X515,X525 ONLY
Q214, Q215
Y/C MIX BUFFER
Q216
X425 ONLY
TRAP
IC201
Y/C PROC
PB Y
NTSC
REC C
PB C
REC Y
FM MOD
CARR SHIFT
DOC DET
2FSC
DELAY
X2
FM AMP
DOUBLE LIMIT
FM DEM
SUB L.P.F
MAIN DEEMPH
KILL
6dB
C L.P.F
PB AMP
B DEEM
KILLER
BG P1
NAP
FSC B.P.F
COMP
KIL DET
1D DET
BGP1
BGP2
BALANCER
ACC AMP
ACC DET
BURST EMPH
BG
SW1
REC NTSC
PB ALL
REC NTSC
MESECAM
L.P.F
C ROT
GND
4 PHASE SHIFTER
SUB CONV
SUB B.P.F
MAIN CONV
FSC B.P.F
DLED
SLD
321 5H VCO
REC AFC DET
PB APC DET
90 P.S
PAL
BGP GEN
HALF H KILER
REC AFC DET
BGP2
VXO
XO
SW2
SW3
3rd LOCK PROTECT
JOG
C SYNC
SYNC DET
CLAMP
L.P.F
DELAY
AGC DET
1/2
CLAMP
Y L.P.F
LIM
K2
CORR
K1
DOC
NOR
NL DEEMPH
WHP NOICAN
PICTURE CONT
Y/C MIX
CLAMP
QV/QH 1NS CHARA 1NS W/D CLIP
VIDEO AMP
VIDEO OUT
SW
Q253
VIDEO AGC
CLAMP
DETAIL ENH
NL EMPH
MAIN EMPF
W/D CLIP
EMPH OUT
SP/LP/EP
L205
5V
L203
L206
L202
5V(CCD)
5V(C)
5V(Y)
DE-EMPH
IC203
SECAM PROCESS
1.1M TRAP
Q202
Q021
REC C
1/4
VIDEO IN
NTSC
PB C IN
X4
PB C OUT
Q205
PB 5V SW
PB 5V
ME SECAM
PB
ACK IN
SECAM
X335 MODEL
SECAM
V PB
PAL 60
NT JUDGE
ME-SECAM
IC501
FROM SYSCON BLOCK
(SEE PAGE 3-7)
NTSC PB
ACK
ME-SECAM
IC202
SECAM DET
C OUT
Q220
BUFFER
SW LIM AMP
FQ PHASE CONV
PD1
SHL
1H DL
PD2
L.P.F
COMP
TIMING GEN.
X315,X335,X425,X515 MODEL
FSC1
FSC2
BGP
PB C OUT
3.58MHz/LP JOG
X425 ONLY
PB IN
CHROMA TRAP
4.2V
REG
Y NR
NOICAN
SHARPNESS
QVD
Q290
BUFFER
QVD
PWM
PWM BACK
NC1,2
RENTAL
TO/FROM SYSCON BLOCK
(SEE PAGE 3-7)
DATA
CLOCK
OSD CS
IC509
CHARACTER GEN.
AN 5V
L401
A VDD
MICON 5V
L450
D VDD
RST
S IN
S CLK
CS
CV IN
Q401
BUFFER
CV OUT
X541 7MHz
XI 2
XO 2
SYNC IN
Q403
BUFFER
VCO O
VCO I
T401
LC FILTER
SP/LP/EP
APC ON
JOG
NTSC
COMP SYNC
RF ENV
RF SWP
IC801
VIDEO SW
SWD5V
L805
CNJ02
VIDEO LINE
AUDIO LINE
IN
OUT
SW 12V
VCC
PB AMP
LINE AMP
MUTE
BUFF
REC AMP
INPUT SW
Q301
MUTE SW
IC301
AUDIO REC/PB AMP,SW
Q801
BUFFER
PLL ENABLE
PLL DATA
PLL CLK
TU AFT
BG/L
+35V
SW12V
D6V
SW5V
Q711
S701
BG ↔ DK
ME,PS ONLY
A MUTE
NA PB
LINE 1
SP
REC P
FROM SYSCON BLOCK
(SEE PAGE 3-7)
A IN
A OUT
V IN
V OUT
IF
TU
+B
BB
MB
BP
ENABLE
DATA
CLK
AFT
SW
GND
IN
OUT
TU702
VHF/UHF

3-3. SERVO, SYSTEM CONTROL BLOCK DIAGRAM

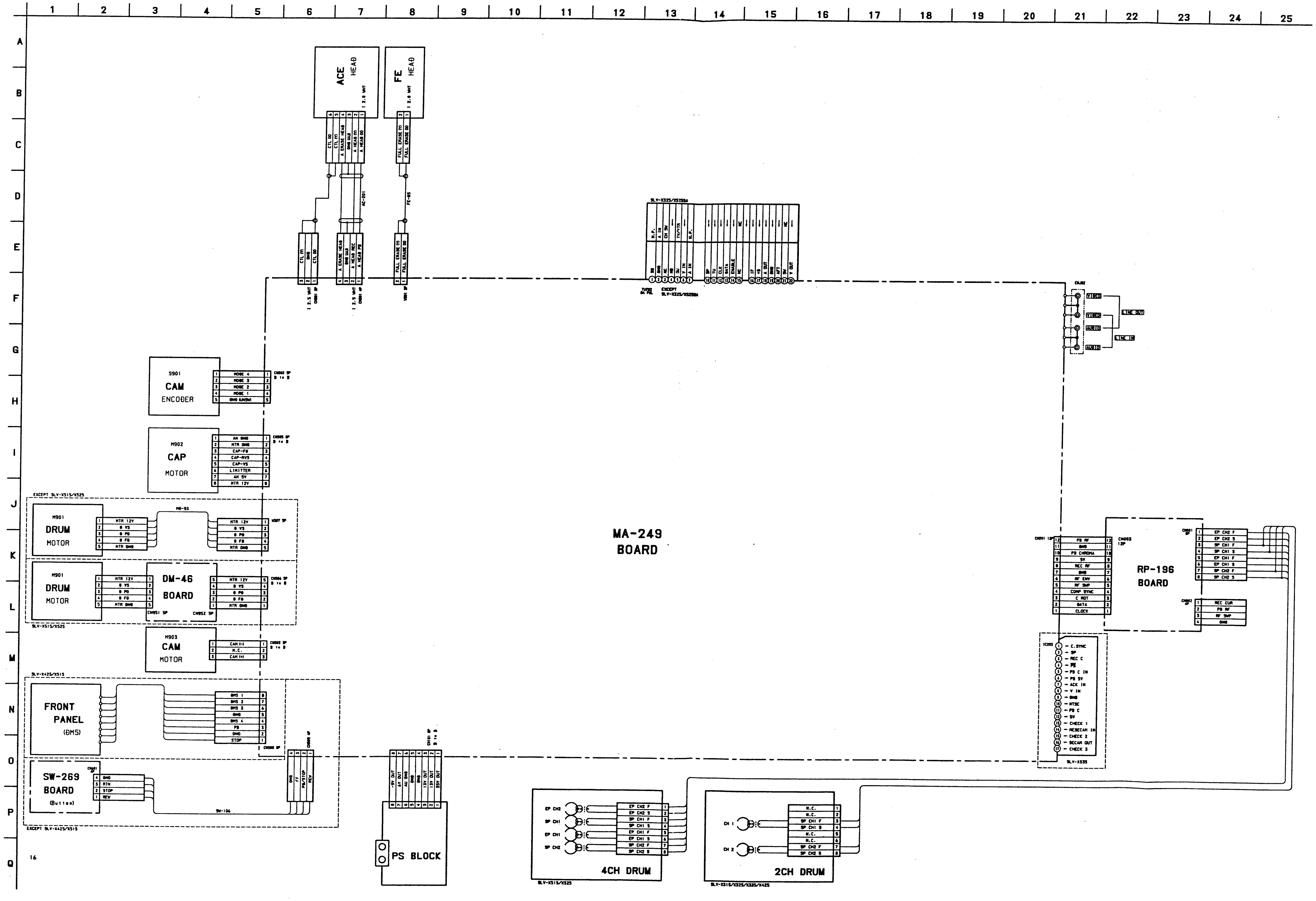

MA-249 BOARD (2/2) SEE PAGE 4-13)
(X315,X325 X335,X425) MODEL
W507
M901
DRUM MOTOR
HALL DEVICE
OUTPUT
OUTPUT
MATRIX
VCC
PG
FG
DM-46 BOARD
CN951
CN952
MTR 12V
D VS
DRUM PG
DRUM FG
(SEE PAGE 4-13)
(X515,X525) MODEL
CN506
MTR 12V
IC501 (1/2)
SERVO CONTROL
DRUM ERR
D PG
D FG
M902
CAPSTAN MOTOR
AN 5V
HALL DEVICE
CNB
VCC
TL
U+
U-
V+
V-
W+
W-
VM
VS
FRC
CAPSTAN FG
CN505
5V
PS501
LIMITER
MTR 12V
CAP ERR
CAP RVS
IC511 (1/2)
CAPSTAN FG AMP
CAP FG
CN501
CTL HEAD
(X)
(Y)
REC CTL
CTL GAIN
PB CTL
IC506 (1/2)
CTL AMP
IC506 (2/2)
REF AMP
AN 5V
RFE 2.5V
IC511 (2/2)
COMPALATOR
IC501 (2/2)
SYSTEM/MODE CONTROL
Ⓐ TO AUDIO BLOCK (SEE PAGE 3-5)
IC301 ⑬ A MUTE
IC301 ⑮ NA PB
IC301 ⑰ LINE 1
IC301 ⑦ SP
IC301 ⑩ REC P
A-MUTE
NA-PB
LINE-1
SP
REC-P
Ⓑ TO/FROM VIDEO BLOCK (SEE PAGE 3-5)
IC201 (25) SP/LP/EP
IC201 (33) APC ON
Q253 Ⓑ JOG
Q203 Ⓑ NTSC
IC201 ⑥ C SYNC
CN201 ⑥ RF ENV
CN201 ③ RF SWP
LP
APC ON
JOG
NTSC
C SYNC
VIDEO-RF
RF SWP
Ⓒ TO/FROM VIDEO BLOCK (SEE PAGE 3-6)
IC201 (27), IC203 ④ V PB
IC201 ⑯ PAL 60
IC201 ⑳, IC203 ⑦ NT JUDGE
IC201 ⑬ ME-SECAM
IC203 ⑯ SECAM
V-PB
PAL 60
NT JUDGE
ME-SECAM
SECAM
X335 MODEL
Ⓓ TO VIDEO BLOCK (SEE PAGE 3-6)
IC201 ⑰ 3.58MHz/LP JOG
3.58MHz/LP JOG
X425 ONLY
Ⓔ TO/FROM VIDEO BLOCK (SEE PAGE 3-6)
IC201 ⑦ QVD
Q209 Ⓑ PWH
IC201 (31) PWM BACK
IC201 ⑧ NC 1.2
IC201 ⑭ RENTAL
IC509 ⑨ DATA
IC509 ⑱ CLOCK
IC509 ⑧ OSD CS
Q-VD
APC + PWM
APC + PWM IN
OPC + NC1
APC + NC2
RENTAL
SO1
SCK1
OSD CS
Ⓕ TO/FROM TUNER BLOCK (SEE PAGE 3-6)
TU702 ⑭ PLL ENABLE
TU702 ⑦ PLL DATA
TU702 ⑫ PLL CLK
TU702 ⑳ TU AFT
TU702 (21) BG/L
PS,ME ONLY
T ENABLE
PLL-DATA
PLL-CLK
TU-AFT
BG
IC502
MICON 5V
EEP ROM
I2C CLK
IC504
UNSWD 5V
REMOTE CONTROL RECEIVER
REMCON
UN SWD 5V
X501 16MHz
M16
M16
Q591
LED DRIVE
D510
D511
POWER
X502 32.768KHz
32K
32K
FROM POWER BLOCK
POWER CONT
MICON 5V
POWER CONT
AD
IC503
D504
L581
D505
L503
VCC1
OUT1
VCC2
OUT2
POWER FAIL
RESET
UNSWD 5V
IC509 (30)
VCC
VCC
VCC
L510
5V
-9V
-9V
FL501
FLUORESCENT DISPLAY
P1
P19
G1
G4
F+
F-
-9V
FUNC KEY1
S502 POWER
S503 EJECT
S504 REC
S506 CH+
EXCEPT (X325,X525)
(F-SECAM)
NTSC
PAL
AUTO
S507
DMS 2
DMS 3
DMS 4
S513
2POSI
S512 CH-
S511 PAUSE
ONPAL
4.43
X315 X325,515 AS,NZ
ONPAL
4.43
3.58
FUNC KEY2
S501 REC PROOF
X425 MODEL ONLY
REC-PRF
T,REEL
PH501 T REEL FG
SWD 12V
PH502 T REEL FG
S,REEL
T,SENS
Q504 T SENS
SWD 12V
S,SENS
Q503 T,SENS
END -LED
Q502 LED DRIVE
IC508
LOADING MOTOR DRIVER
VCC1
VCC2
MTR 12V
IN1
IN2
CAM(-)
CAM(+)
CAM1
CAM2
CN503
CAM(-)
CAM(+)
M903 LOADING MOTOR
MODE1
MODE2
MODE3
MODE4
CN502
ROTARY SWITCH (MECHA POSITION)
X425,X515 MODEL
CN508
DMS1
DMS2
DMS3
DMS4
PB
STOP
DMS BLOCK
SHUTTLE SWITCH
SW-269 BOARD
CN509
REW
PB/STOP
FF
S591 FF
S592 PB
S593 STOP
S594 REW
X315,X325,X335,X525 MODEL
(SEE PAGE4-15)

3-4. POWER SUPPLY BLOCK DIAGRAM


POWER SUPPLY
(SEE PAGE 4-23, 25)
AC IN
SWITCHING REGULATOR
MA-249 BOARD
(SEE PAGE 4-10, 13, 17, 19, 21)
CN101
35V
L121
13V
6V
9V
PS121
PS122
IC141
12V REG
Q131,132
MTR 12V SW
Q161
5V SW
FL- FH+
FL501
(PL DISPLAY)
TU702
VHF/UHF TUNER
MICON 5V
IC201
L203
5VCCD
L202
5V Y
L206
5V C
Y/C PROC
X315,X335,X425,X515
IC202
SECAM DET
L205
IC301
L302
AUDIO REC/PB AMP,SW
X335 ONLY
IC203
L207
SECAM PROC
D504
L581
D505
L503
IC503
POWER FAIL DET
RESET PULSE GEN.
IC506
CTL AMP
L505
IC502
EEP ROM
IC511
COMP/ CAP FG AMP
IC501
L510
SERVO/ SYSCON/ MODE CONTROL
POWER CONT
IC504
REMOTE CONTROL RECEIVER
IC506
LOADING MOTOR DRIVE
IC801
L805
VIDEO SW
IC509
L401
AVDD
DVDD
L450
CHARACTOR GEN.
PS501
CN201
5V
AU 5V
LIMITER
MTR 12V
CN505
MTR 12V
CN506
X315,X325
X335,X425
MODEL
MTR 12V
W507
(SEE PAGE 4-7)
RP-196 BOARD
IC001
CN003
L003
L004
VIDEO REC/PB AMP
CAPSTAN MOTOR
CNB
CAPSTAN MOTOR DRIVE
DM-46 BOARD
CN952
M12V
CN951
X515,X525 MODEL
(SEE PAGE 4-13)
DRUM MOTOR
E
DRUM MOTOR

SECTION 4
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

4-1. FRAME SCHEMATIC DIAGRAM


ACE HEAD
FE HEAD
S901 CAM ENCODER
M902 CAP MOTOR
M901 DRUM MOTOR
M901 DRUM MOTOR
DM-46 BOARD
M903 CAM MOTOR
FRONT PANEL (BMS)
SW-269 BOARD (Button)
PS BLOCK
MA-249 BOARD
RP-196 BOARD
4CH DRUM
2CH DRUM
EXCEPT SLV-X515/X525
SLV-X515/X525
SLV-X425/X515
EXCEPT SLV-X425/X515
SLV-X515/X525
SLV-X315/X325/X335/X425
SLV-X335
LINE OUT
LINE IN
VIDEO
AUDIO
A B C D E F G H I J K L M N O P Q
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

X4

4-2.

THIS I
AND S
(In ad
block.)

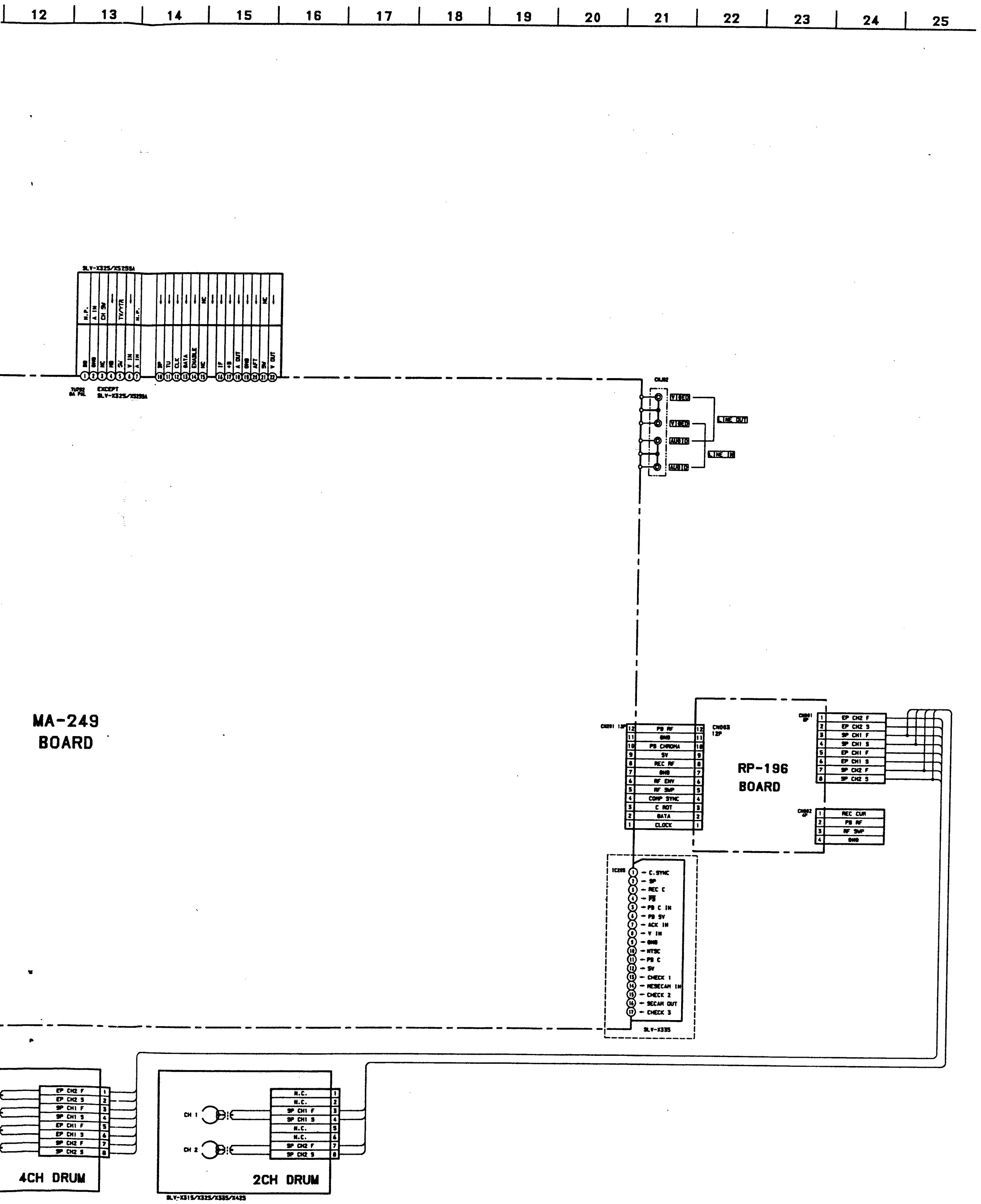
For prir

*Cauti
Patterr
(Condu
Patterr
(Comp

For sch
- Cauti
New
Be ca
is dar
- All re
Chip
kΩ:
- All ca
50V
- Circle
- Read
- Volta
- Read
- Voltag

When
numbe
name.

- *: indi



4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.
(In addition to this, the necessary note is printed in each block.)

For printed wiring boards:

- ○ : Through hole is omitted.
- ▬ : Pattern from the side which enables seeing.
- ▬ : Pattern of the rear side.*

***Caution:**

Pattern face side: (Conductor Side)	Parts on the pattern face side seen from the pattern face are indicated.
Pattern face side: (Component Side)	Parts on the parts face side seen from the parts face are indicated.

For schematic diagram:

- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4 W unless otherwise noted.
  Chip resistors: 1/10 W unless otherwise noted.
  kΩ: 1000kΩ, MΩ: 1000KΩ.
- All capacitors are in μF unless otherwise noted. pF: μ μF.
  50V or less are not indicated except for electrolytics and tantalums.
- ▭ : panel designation.
- △ : internal component
- ▬ : B+Line.*
- ▬ ▬ ▬ : B-Line.*
- ➡ : IN/OUT direction of B line (+, -).*
- Circled numbers refer to wavwforms.*
- Readings are taken with a PAL color-bar signal input.
- Voltage are dc between ground and measurement points.*
- Readings are taken with a digital multimeter (DC10MΩ).*
- Voltage variations may be noted due to normal production tolerances.*

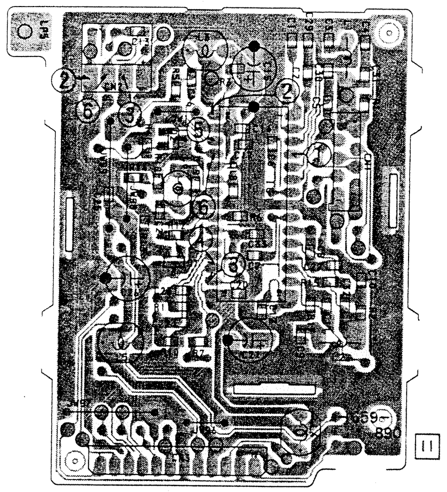
When indicating parts by reference number, please include the board name.

- *: indicated by the color red.

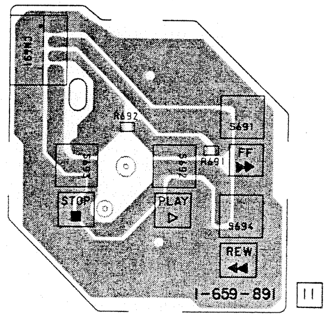
MA-249 (MAIN), RP-196 (HEAD AMP), SW-269 (SWITCH), DM-46 (TRANSLATION) PRINTED WIRING BOARDS

— Ref. No. : MA-249 Board: 1,000 Series, RP-196 Board: 2,000 Series, SW-269 Board: 2,000 Series, DM-46 Board: 1,000 Series —

RP-196 BOARD



SW-269 BOARD

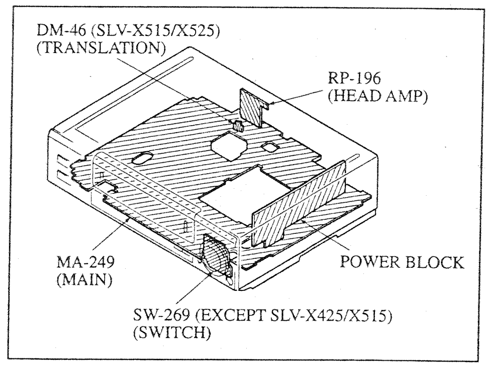

STOP
PLAY
FF
REW
1-659-891 11

MA-249 BOARD

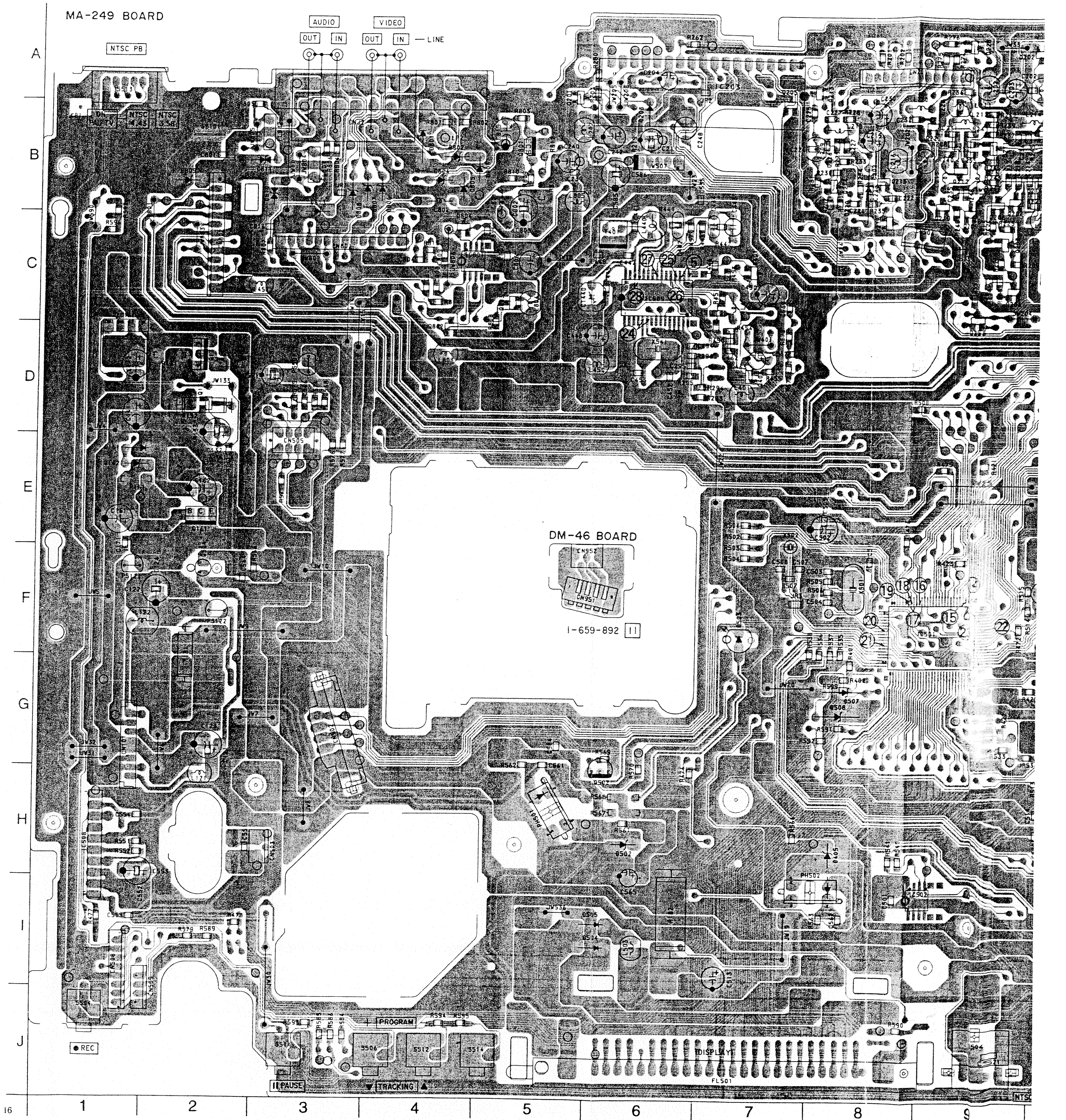
CN101	G-1	IC504	J-9
CN201	A-8	IC506	G-13
CN301	D-12	IC508	H-1
CN501	H-13	IC509	C-6
CN502	G-3	IC511	G-12
CN503	H-3	IC801	C-4
CN505	E-3		
CN506	C-8	Q131	D-2
CN508	I-1	Q132	D-2
CN509	J-2	Q161	E-2
		Q201	A-5
D131	D-2	Q202	A-9
D161	E-1	Q203	C-9
D162	E-1	Q205	B-7
D202	B-8	Q209	B-9
D301	D-11	Q210	B-9
D302	D-11	Q211	B-9
D503	F-7	Q212	B-9
D504	I-6	Q214	B-8
D505	I-6	Q215	B-8
D506	G-11	Q216	C-8
D507	G-7	Q219	B-10
D508	G-8	Q220	C-11
D510	J-13	Q253	D-9
D511	J-13	Q290	F-11
D701	C-12	Q301	D-11
D702	B-12	Q302	E-12
D809	B-2	Q303	F-12
		Q304	E-11
IC141	D-1	Q401	C-7
IC201	B-10	Q403	D-7
IC202	C-11	Q502	G-6
IC203	A-7	Q503	F-11
IC301	D-11	Q504	F-2
IC501	F-8	Q591	I-13
IC502	H-9	Q711	D-13
IC503	H-10	Q801	B-5

DM-46 BOARD

CN951	F-5
CN952	F-5


DM-46 (SLV-X515/X525)
(TRANSLATION)
RP-196
(HEAD AMP)
MA-249
(MAIN)
POWER BLOCK
SW-269 (EXCEPT SLV-X425/X515)
(SWITCH)

MA-249 BOARD


AUDIO
VIDEO
OUT
IN
OUT
IN
— LINE
NTSC PB
DM-46 BOARD
CN951
CN952
1-659-892 11
● REC
PROGRAM
DISPLAY
PAUSE
TRACKING
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9

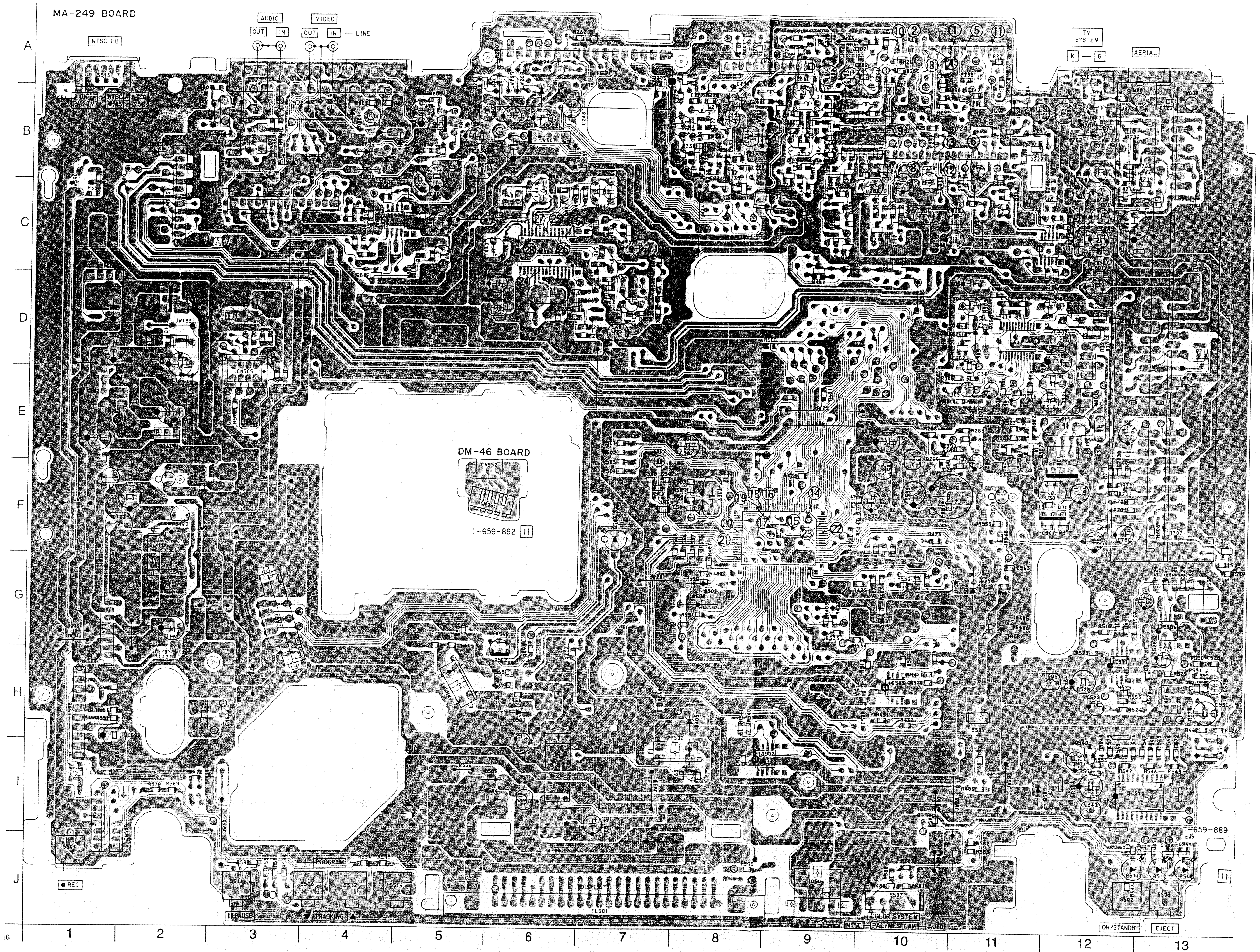
AF/
525SA

DS

) Series —

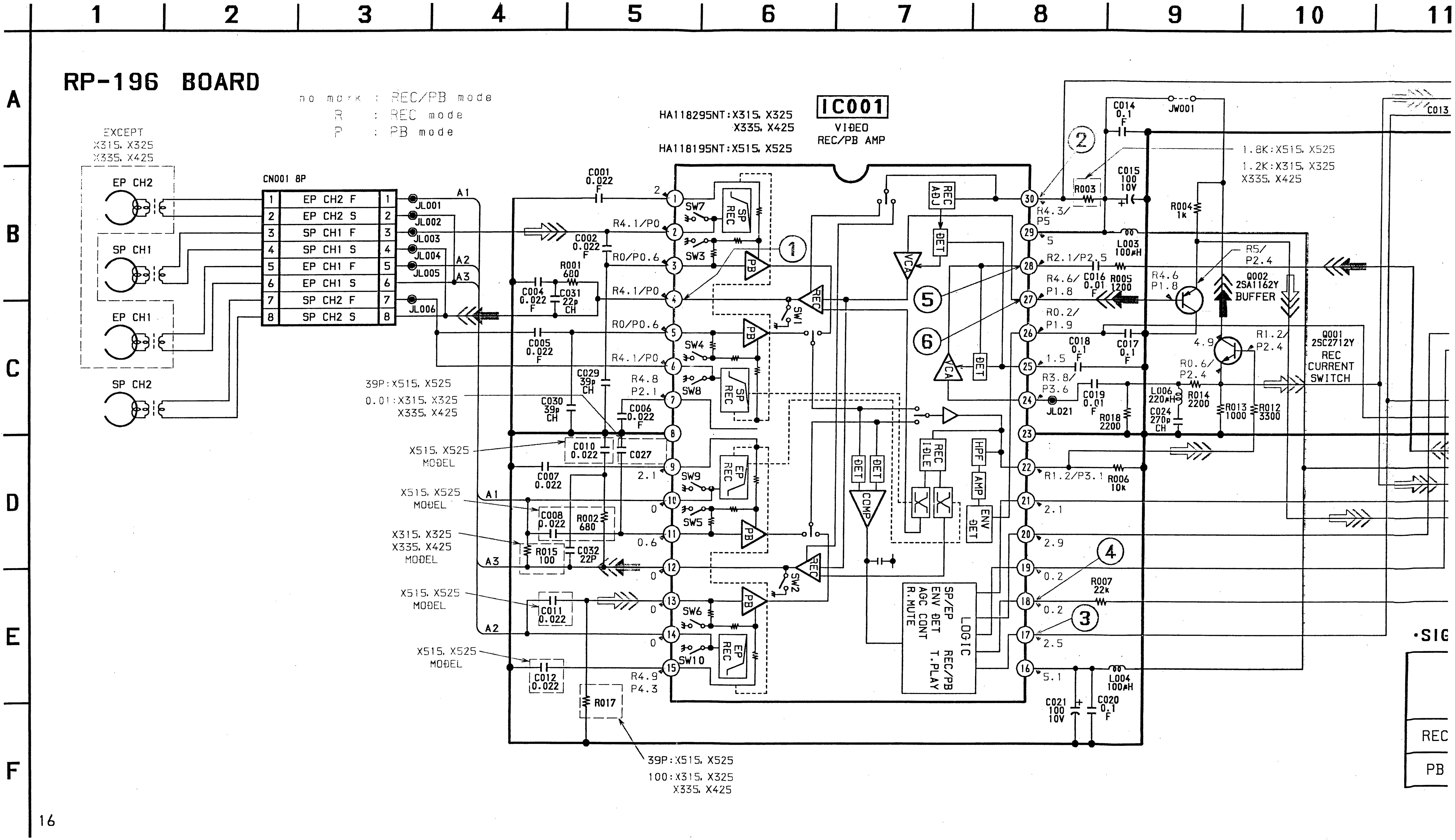
OARD

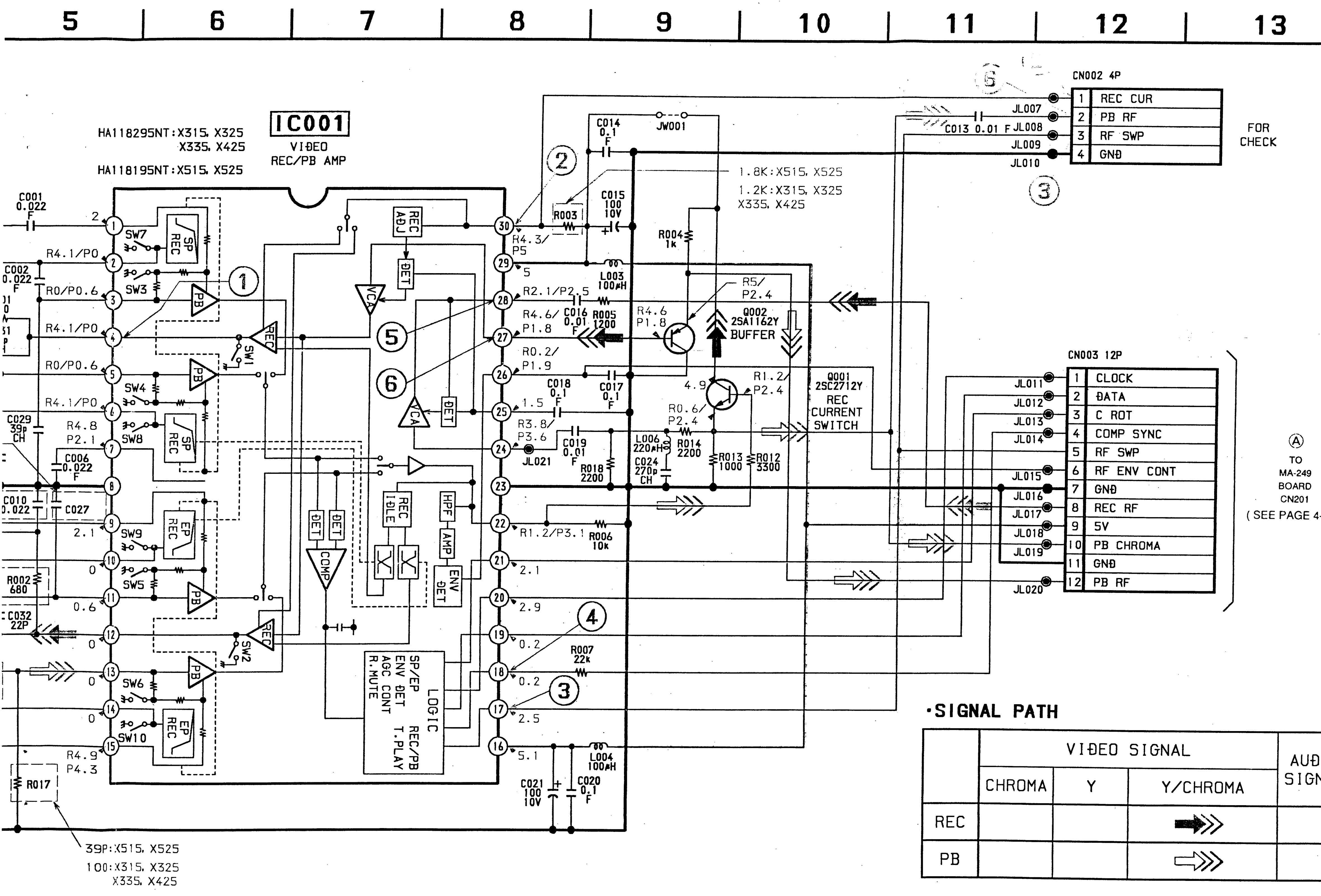
F-5
F-5


MA-249 BOARD
NTSC PB
AUDIO
VIDEO
OUT
IN
OUT
IN
— LINE
TV SYSTEM
K — G
AERIAL
DM-46 BOARD
1-659-892 11
1-659-889
11
● REC
II PAUSE
▼ TRACKING ▲
PROGRAM
DISPLAY
FL501
NTSC
PAL/MESECAM
COLOR SYSTEM
AUTO
ON/STANDBY
EJECT
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12
13

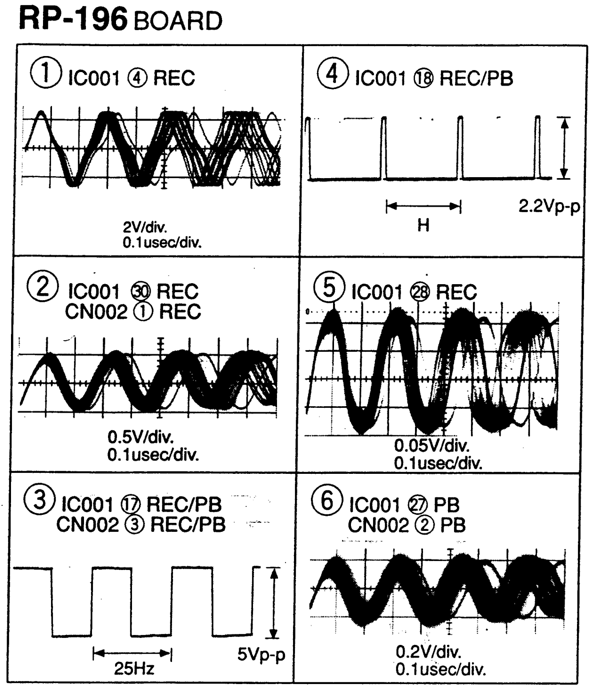
RP-196 (HEAD AMP) SCHEMATIC DIAGRAM

— Ref. No. : RP-196 Board: 2,000 Series —


1 2 3 4 5 6 7 8 9 10 11
A B C D E F
RP-196 BOARD
no mark : REC/PB mode
R : REC mode
P : PB mode
EXCEPT X315, X325 X335, X425
EP CH2
SP CH1
EP CH1
SP CH2
CN001 8P
EP CH2 F
EP CH2 S
SP CH1 F
SP CH1 S
EP CH1 F
EP CH1 S
SP CH2 F
SP CH2 S
JL001
JL002
JL003
JL004
JL005
JL006
A1
A2
A3
HA118295NT:X315, X325 X335, X425
HA118195NT:X515, X525
IC001
VIDEO REC/PB AMP
C001 0.022 F
C002 0.022 F
R001 680
C004 0.022 F
C031 22p CH
C005 0.022 F
C029 39p CH
C030 39p CH
C006 0.022 F
C010 0.022
C027
C007 0.022
C008 0.022
R002 680
R015 100
C032 22P
C011 0.022
C012 0.022
R017
39P:X515, X525
0.01:X315, X325 X335, X425
X515, X525 MODEL
X315, X325 X335, X425 MODEL
39P:X515, X525
100:X315, X325 X335, X425
R4.1/P0
R0/P0.6
R4.1/P0
R0/P0.6
R4.1/P0
R4.8 P2.1
2.1
0
0.6
0
0
0
R4.9 P4.3
SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
SW10
SP REC
EP REC
PB
REC
VCA
DET
REC ADJ
COMP
REC IDLE
HPF
AMP
ENV DET
LOGIC
SP/EP
ENV DET
AGC CONT
R.MUTE
REC/PB
T.PLAY
① ② ③ ④ ⑤ ⑥
R4.3/ P5
5
R2.1/P2.5
R4.6/ P1.8
R0.2/ P1.9
1.5
R3.8/ P3.6
R1.2/P3.1
2.1
2.9
0.2
0.2
2.5
5.1
C014 0.1 F
JW001
C013
1.8K:X515, X525
1.2K:X315, X325 X335, X425
R003
C015 100 10V
R004 1k
L003 100μH
C016 0.01 F
R005 1200
C018 0.1 F
C017 0.1 F
C019 0.01 F
JL021
R018 2200
L006 220μH
C024 270p CH
R014 2200
R013 1000
R012 3300
R006 10k
R007 22k
L004 100μH
C021 100 10V
C020 0.1 F
R4.6 P1.8
R5/ P2.4
Q002 2SA1162Y BUFFER
4.9
R0.6/ P2.4
R1.2/ P2.4
Q001 2SC2712Y REC CURRENT SWITCH
•SIG
REC
PB
16


5
6
7
8
9
10
11
12
13
IC001
VIDEO REC/PB AMP
HA118295NT:X315, X325 X335, X425
HA118195NT:X515, X525
C001 0.022 F
C002 0.022 F
C029 39p CH
C006 0.022 F
C010 0.022
C027
R002 680
C032 22P
R017
39P:X515, X525
100:X315, X325 X335, X425
SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
SW10
SP REC
EP REC
PB
REC
VCA
DET
REC ADJ
COMP
REC IDLE
HPF
AMP
ENV DET
LOGIC
SP/EP
ENV DET
AGC CONT
R.MUTE
REC/PB
T.PLAY
R4.1/P0
R0/P0.6
R4.8 P2.1
2.1
0
0.6
R4.9 P4.3
R4.3/P5
5
R2.1/P2.5
R4.6/P1.8
R0.2/P1.9
1.5
R3.8/P3.6
R1.2/P3.1
2.1
2.9
0.2
0.2
2.5
5.1
C014 0.1 F
JW001
C013 0.01 F
R003
C015 100 10V
L003 100μH
C016 0.01 F
R005 1200
C018 0.1 F
C017 0.1 F
C019 0.01 F
JL021
R018 2200
R006 10k
R007 22k
L004 100μH
C021 100 10V
C020 0.1 F
R004 1k
1.8K:X515, X525
1.2K:X315, X325 X335, X425
R5/P2.4
Q002 2SA1162Y BUFFER
R4.6 P1.8
4.9
R1.2/P2.4
Q001 2SC2712Y REC CURRENT SWITCH
R0.6/P2.4
L006 220μH
C024 270p CH
R014 2200
R013 1000
R012 3300
CN002 4P
JL007
JL008
JL009
JL010
1 REC CUR
2 PB RF
3 RF SWP
4 GND
FOR CHECK
CN003 12P
JL011
JL012
JL013
JL014
JL015
JL016
JL017
JL018
JL019
JL020
1 CLOCK
2 DATA
3 C ROT
4 COMP SYNC
5 RF SWP
6 RF ENV CONT
7 GND
8 REC RF
9 5V
10 PB CHROMA
11 GND
12 PB RF
Ⓐ
TO MA-249 BOARD CN201
(SEE PAGE 4-11)
①
②
③
④
⑤
⑥

RP-196 BOARD



•SIGNAL PATH

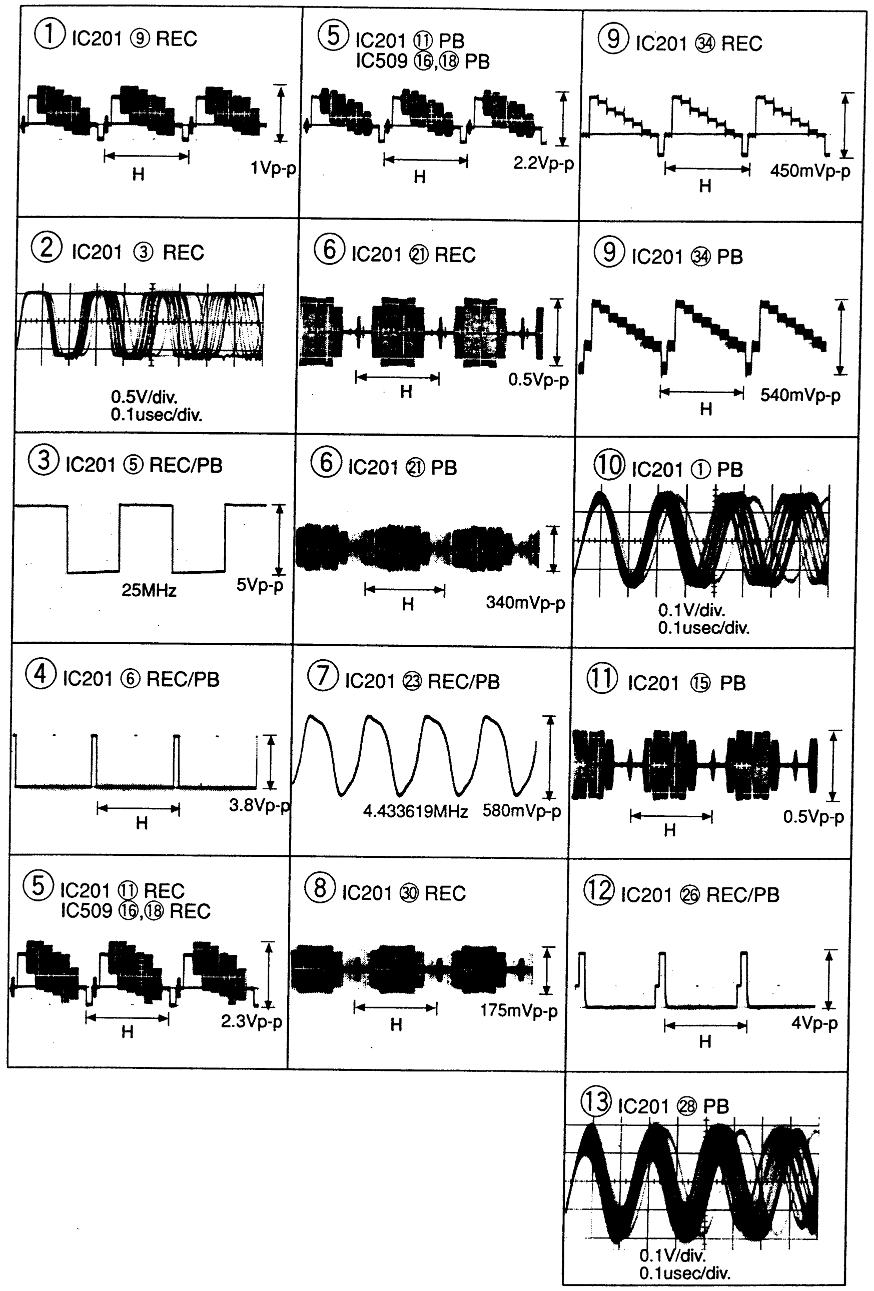
	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			➡≫	
PB			⇨≫	

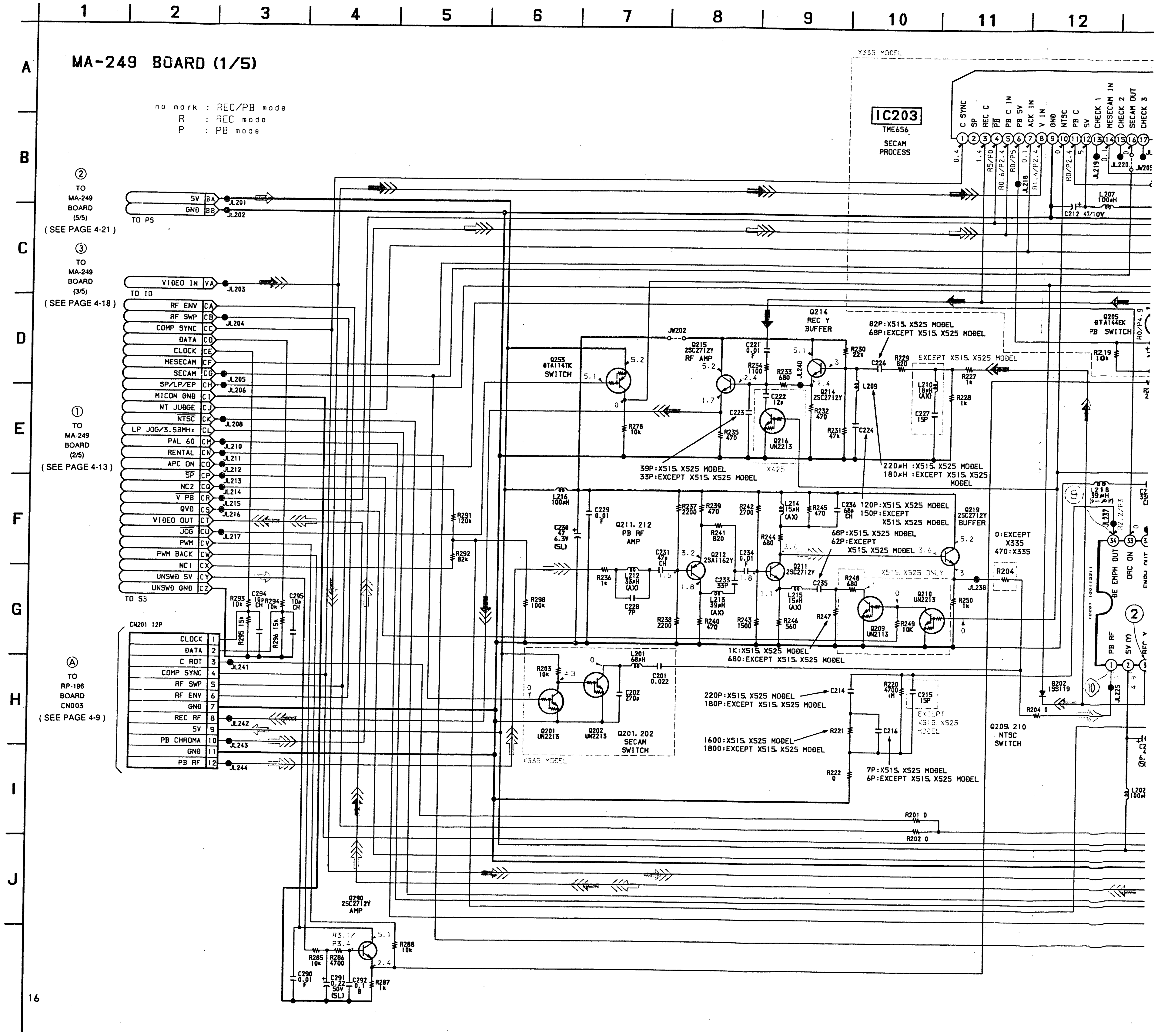
MA-249 (VIDEO) SCHEMATIC DIAGRAM

— Ref. No. : MA-249 Board: 1,000 Series —

• See page 4-4 to 4-6 for the printed wiring board.

MA-249 BOARD

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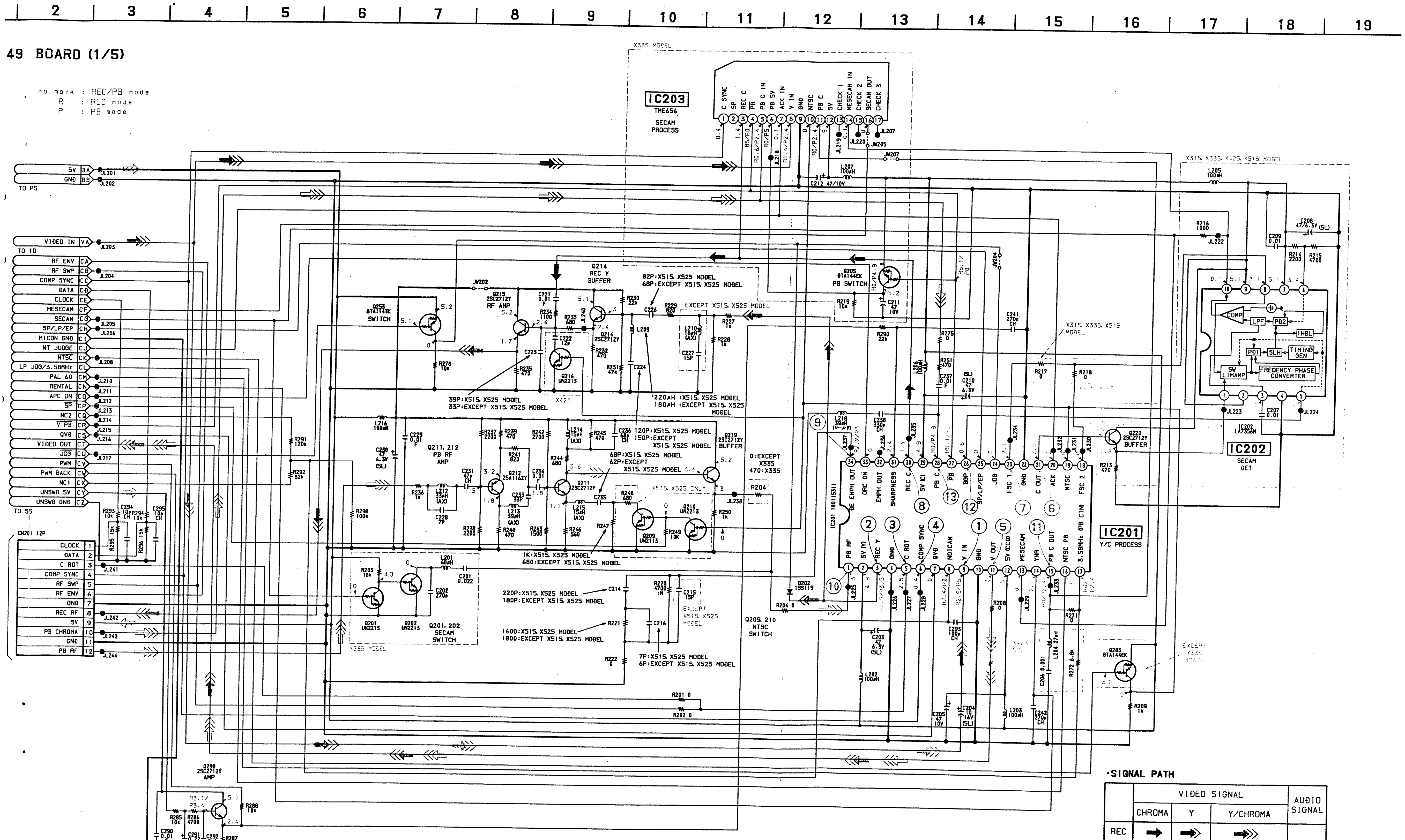
A
B
C
D
E
F
G
H
I
J
MA-249 BOARD (1/5)
no mark : REC/PB mode
R : REC mode
P : PB mode
② TO MA-249 BOARD (5/5) (SEE PAGE 4-21)
5V
GND
TO PS
③ TO MA-249 BOARD (3/5) (SEE PAGE 4-18)
VIDEO IN
TO IO
① TO MA-249 BOARD (2/5) (SEE PAGE 4-13)
RF ENV
RF SWP
COMP SYNC
DATA
CLOCK
MESECAM
SECAM
SP/LP/EP
MICON GND
NT JUDGE
NTSC
LP JOG/3.58MHz
PAL 60
RENTAL
APC ON
SP
NC2
V PB
DVD
VIDEO OUT
JOG
PWM
PWM BACK
NC1
UNSW5 5V
UNSW5 GND
TO SS
Ⓐ TO RP-196 BOARD CN003 (SEE PAGE 4-9)
CN201 12P
CLOCK
DATA
C ROT
COMP SYNC
RF SWP
RF ENV
GND
REC RF
5V
PB CHROMA
GND
PB RF
IC203
TMF656
SECAM PROCESS
X335 MODEL
Q214 REC Y BUFFER
Q215 2SC2712Y RF AMP
Q253 DTA114TK SWITCH
Q211, 212 PB RF AMP
Q201, 202 SECAM SWITCH
Q219 2SC2712Y BUFFER
Q205 DTA144EK PB SWITCH
Q209, 210 NTSC SWITCH
Q290 2SC2712Y AMP
82P:X515, X525 MODEL
68P:EXCEPT X515, X525 MODEL
39P:X515, X525 MODEL
33P:EXCEPT X515, X525 MODEL
220μH :X515, X525 MODEL
180μH :EXCEPT X515, X525 MODEL
120P:X515, X525 MODEL
150P:EXCEPT
68P:X515, X525 MODEL
62P:EXCEPT X515, X525 MODEL
0:EXCEPT X335
470:X335
1K:X515, X525 MODEL
680:EXCEPT X515, X525 MODEL
220P:X515, X525 MODEL
180P:EXCEPT X515, X525 MODEL
1600:X515, X525 MODEL
1800:EXCEPT X515, X525 MODEL
7P:X515, X525 MODEL
6P:EXCEPT X515, X525 MODEL
16

49 BOARD (1/5)

no mark : REC/PB mode
R : REC mode
P : PB mode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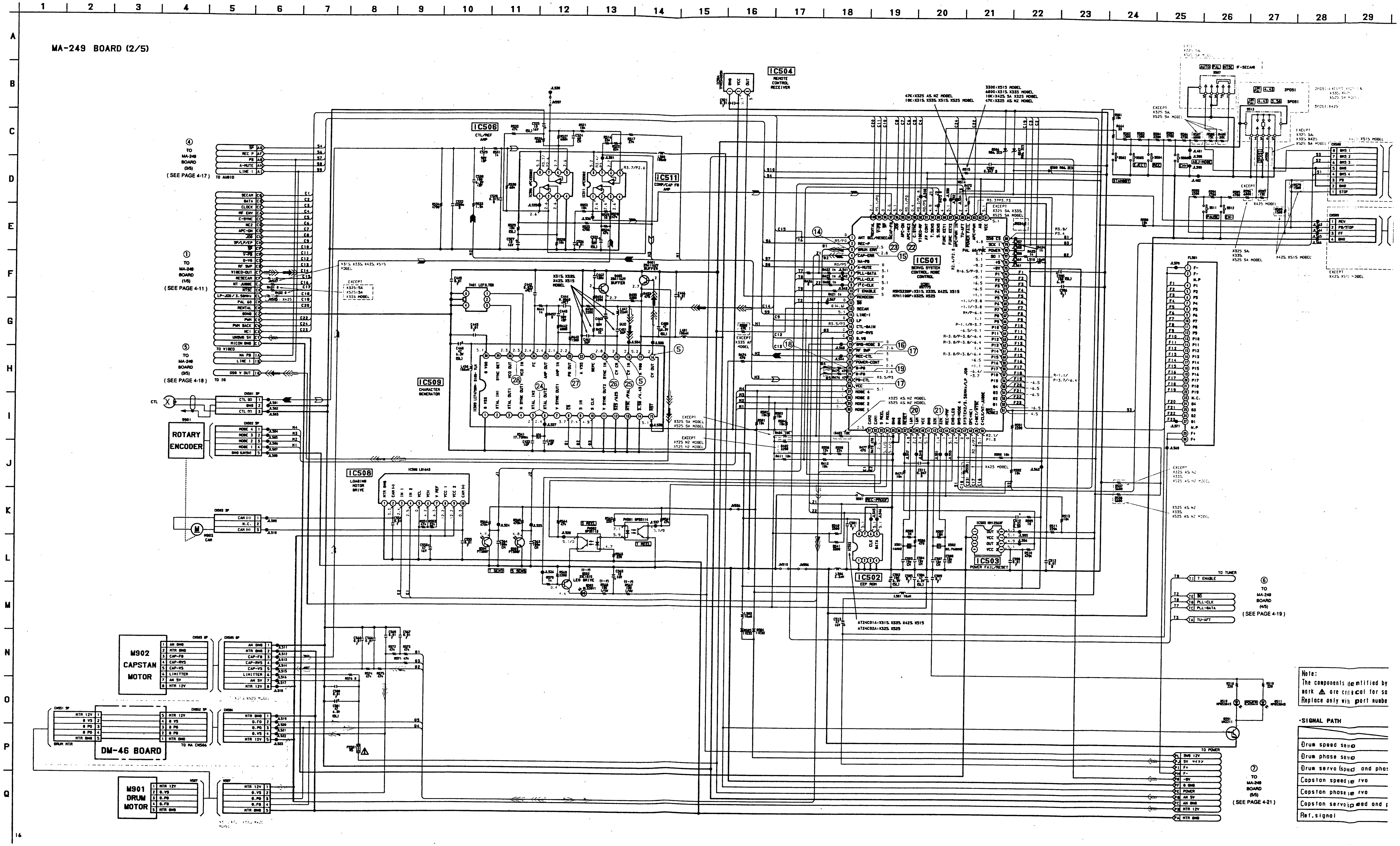
X335 MODEL
IC203
TME656
SECAM PROCESS
C SYNC
SP
REC C
PB
PB C IN
PB 5V
ACK IN
V IN
GND
NTSC
PB C
5V
CHECK 1
MESECAM IN
CHECK 2
SECAM OUT
CHECK 3
X315, X335, X425, X515 MODEL
5V
GND
TO PS
VIDEO IN
TO IO
RF ENV
RF SWP
COMP SYNC
DATA
CLOCK
MESECAM
SECAM
SP/LP/EP
MICON GND
NT JUDGE
NTSC
LP JOG/3.58MHz
PAL 60
RENTAL
APC ON
SP
NC2
V PB
QVG
VIDEO OUT
JOG
PWM BACK
NC1
UNSWD 5V
UNSWD GND
TO SS
CN201 12P
CLOCK
DATA
C ROT
COMP SYNC
RF SWP
RF ENV
GND
REC RF
5V
PB CHROMA
GND
PB RF
Q253 DTA114TK SWITCH
Q215 2SC2712Y RF AMP
Q214 REC Y BUFFER
Q214 2SC2712Y
Q216 UN2213
82P:X515, X525 MODEL
68P:EXCEPT X515, X525 MODEL
EXCEPT X515, X525 MODEL
39P:X515, X525 MODEL
33P:EXCEPT X515, X525 MODEL
220μH :X515, X525 MODEL
180μH :EXCEPT X515, X525 MODEL
Q205 DTA144EK PB SWITCH
Q211, 212 PB RF AMP
Q211 2SC2712Y
Q212 2SA1162Y
120P:X515, X525 MODEL
150P:EXCEPT X515, X525 MODEL
68P:X515, X525 MODEL
62P:EXCEPT X515, X525 MODEL
Q219 2SC2712Y BUFFER
X515, X525 ONLY
Q209 UN2213
Q210 UN2213
1K:X515, X525 MODEL
680:EXCEPT X515, X525 MODEL
0:EXCEPT X335
470:X335
Q201 UN2213
Q202 UN2213
Q201, 202 SECAM SWITCH
X335 MODEL
220P:X515, X525 MODEL
180P:EXCEPT X515, X525 MODEL
1600:X515, X525 MODEL
1800:EXCEPT X515, X525 MODEL
7P:X515, X525 MODEL
6P:EXCEPT X515, X525 MODEL
EXCEPT X515, X525 MODEL
Q209, 210 NTSC SWITCH
D202 1SS119
IC201 (BD1153I1)
IC201
Y/C PROCESS
DE EMPH OUT
ORC ON
EMPH OUT
SHARPNESS
REC C
5V (C)
PB C
PB
BGP
SP/LP/EP
JOG
FSC 1
GND
C OUT
ACK
NTSC
FSC 2
PB RF
5V (Y)
REC Y
GND
C ROT
COMP SYNC
QVG
NOICAN
V IN
GND
V OUT
5V (CCD)
MESECAM
YNR
PB C OUT
NTSC PB
3.58MHz (PB C IN)
IC202 LA7556N
IC202
SECAM DET
COMP
LPF
PD2
1HDL
PD1
SLH
TIMING GEN
SW LIMAMP
FREQUENCY PHASE CONVERTER
X315, X335, X515 MODEL
Q220 2SC2712Y BUFFER
Q203 DTA144EK
EXCEPT X335 MODEL
Q290 2SC2712Y AMP
R201 0
R202 0

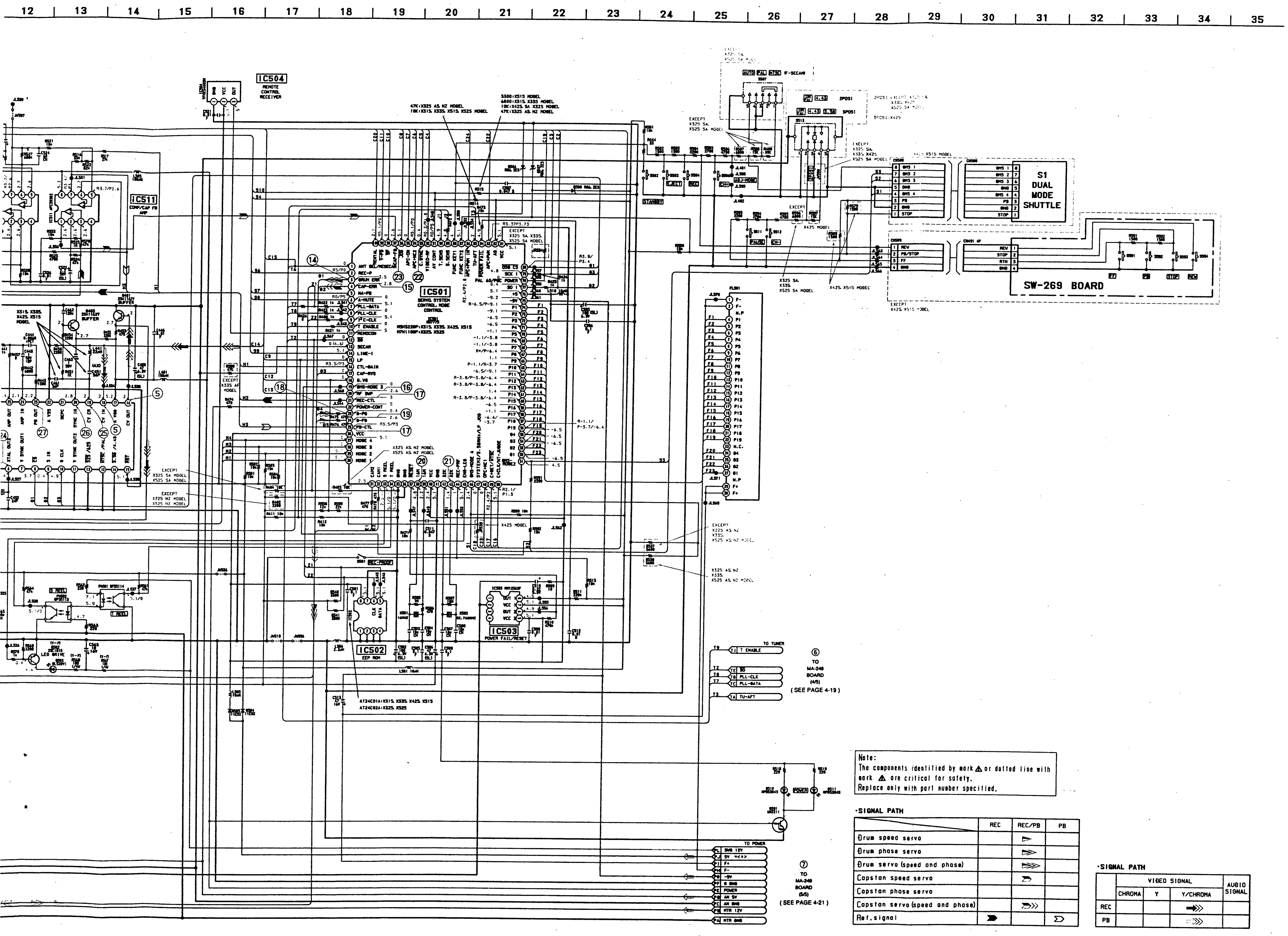
·SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC	➡	⇛	⇛	
PB			⇛	

MA-249 (SERVO, SYSTEM CONTROL), SW-269 (SWITCH), DM-46 (TRANSLATION) SCHEMATIC DIAGRAMS

— Ref. No. : MA-249 Board: 1,000 Series, SW-249 Board: 2,000 Series DM-46 Board: 1,000 Series —


MA-249 BOARD (2/5)
IC501 SERVO, SYSTEM CONTROL, MODE CONTROL
IC502 EEP ROM
IC503 POWER FAIL/RESET
IC504 REMOTE CONTROL RECEIVER
IC506 CTL/REF AMP
IC508 LOADING MOTOR DRIVE
IC509 CHARACTER GENERATOR
IC511 COMP/CAP FG AMP
ROTARY ENCODER
M902 CAPSTAN MOTOR
M901 DRUM MOTOR
DM-46 BOARD
TO MA-249 BOARD (3/5) (SEE PAGE 4-17)
TO MA-249 BOARD (1/5) (SEE PAGE 4-11)
TO MA-249 BOARD (3/5) (SEE PAGE 4-18)
TO MA-249 BOARD (4/5) (SEE PAGE 4-19)
TO MA-249 BOARD (5/5) (SEE PAGE 4-21)
TO TUNER
TO POWER
Note:
The components identified by
mark ⚠ are critical for sa
Replace only with part numbe
-SIGNAL PATH
Drum speed servo
Drum phase servo
Drum servo (speed and phas
Capstan speed servo
Capstan phase servo
Capstan servo (speed and p
Ref. signal


12
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27
28
29
30
31
32
33
34
35
IC504
REMOTE CONTROL RECEIVER
IC511
COMP/CAP FB AMP
IC501
SERVO SYSTEM CONTROL MODE CONTROL
IC502
EEP ROM
IC503
POWER FAIL/RESET
S1
DUAL MODE SHUTTLE
SW-269 BOARD
TO TUNER
⑥
TO MA-249 BOARD (4/5)
(SEE PAGE 4-19)
TO POWER
⑦
TO MA-249 BOARD (5/5)
(SEE PAGE 4-21)

Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

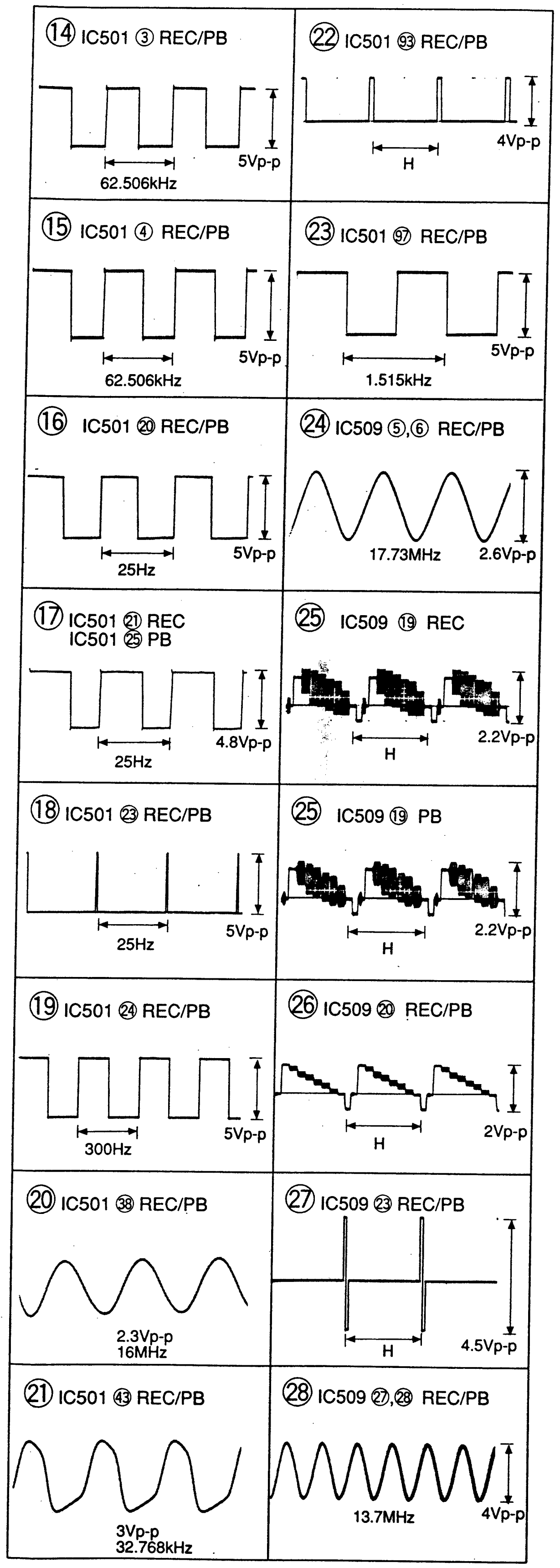
·SIGNAL PATH

	REC	REC/PB	PB
Drum speed servo		▷	
Drum phase servo		▷>	
Drum servo (speed and phase)		▷>>	
Capstan speed servo		▷	
Capstan phase servo			
Capstan servo (speed and phase)		▷>>	
Ref. signal	➤		▷

·SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			➡>>	
PB			⇢>>	

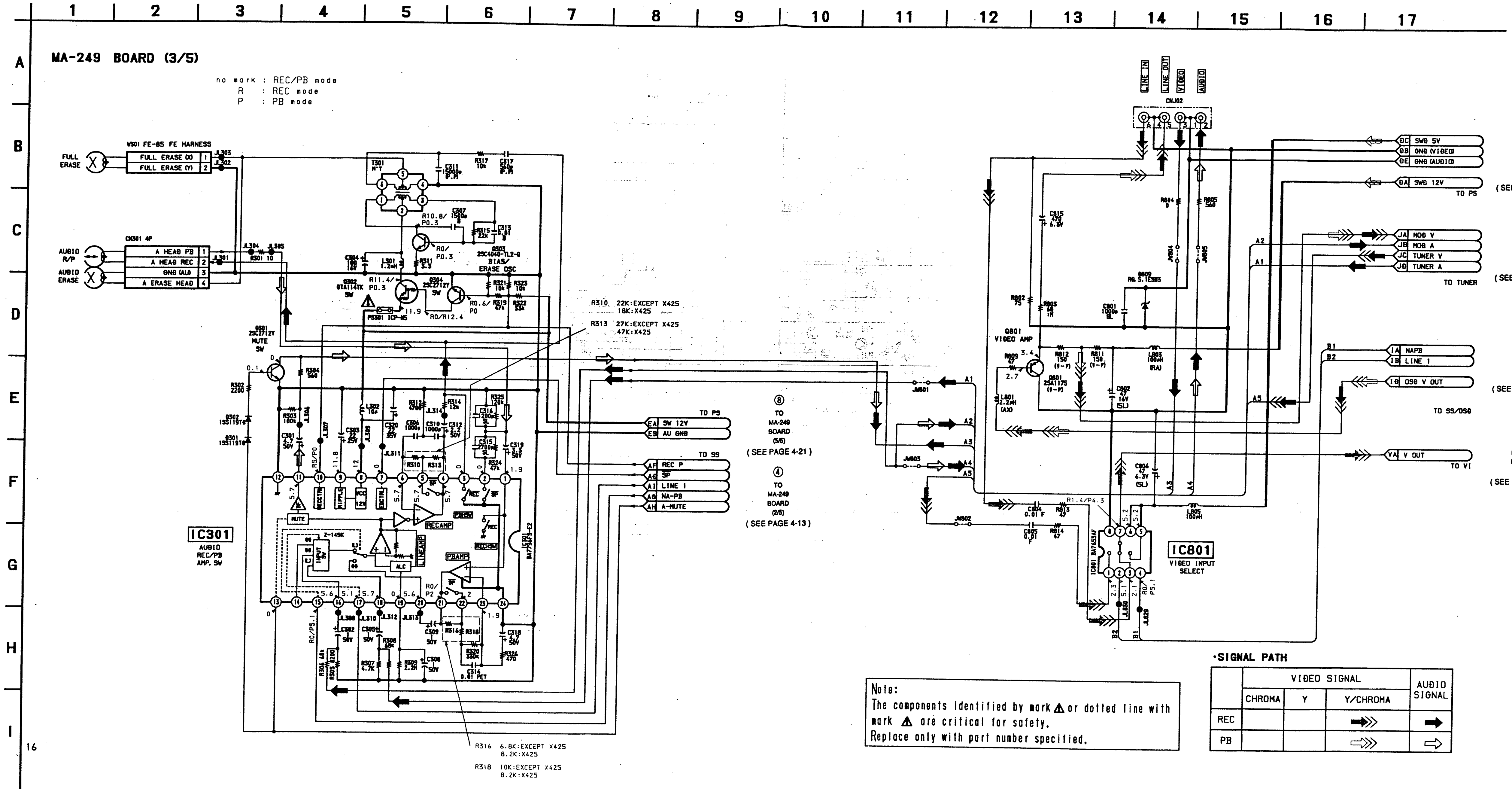
MA-249 BOARD



MA-249 (AUDIO) SCHEMATIC DIAGRAM

— Ref. No. : MA-249 Board: 1,000 Series —

- See page 4-4 to 4-6 for the printed wiring board.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I
MA-249 BOARD (3/5)
no mark : REC/PB mode
R : REC mode
P : PB mode
FULL ERASE
V301 FE-85 FE HARNESS
FULL ERASE (X)
FULL ERASE (Y)
JL303
JL302
AUDIO R/P
AUDIO ERASE
CN301 4P
A HEAD PB
A HEAD REC
GND (AU)
A ERASE HEAD
JL301
JL304
JL305
R301 10
T301 H'T
Q301 2SC2712Y MUTE SW
Q302 DTA114TK SW
Q303 2SC4040-TL2-Q BIAS/ERASE OSC
Q304 2SC2712Y SW
PS301 ICP-N5
R310 22K:EXCEPT X425
18K:X425
R313 27K:EXCEPT X425
47K:X425
IC301
AUDIO REC/PB AMP, SW
MUTE
ALC
RECAMP
PBAMP
RECEQ
PBEQ
R316 6.8K:EXCEPT X425
8.2K:X425
R318 10K:EXCEPT X425
8.2K:X425
TO PS
EA SW 12V
EB AU GND
TO SS
AF REC P
AG SP
AI LINE 1
AG NA-PB
AH A-MUTE
⑧
TO
MA-249
BOARD
(5/5)
(SEE PAGE 4-21)
④
TO
MA-249
BOARD
(2/5)
(SEE PAGE 4-13)
LINE IN
LINE OUT
VIDEO
AUDIO
CNJ802
Q801 VIDEO AMP
Q801 2SA1175
IC801
VIDEO INPUT SELECT
JW801
JW802
JW803
A1
A2
A3
A4
A5
B1
B2
DC SWD 5V
DB GND (VIDEO)
DE GND (AUDIO)
DA SWD 12V
TO PS
⑨
TO
MA-249
BOARD
(5/5)
(SEE PAGE 4-21)
JA MOD V
JB MOD A
JC TUNER V
JD TUNER A
TO TUNER
⑩
TO
MA-249
BOARD
(4/5)
(SEE PAGE 4-19)
IA NAPB
IB LINE 1
ID OSD V OUT
TO SS/OSD
⑤
TO
MA-249
BOARD
(2/5)
(SEE PAGE 4-13)
VA V OUT
TO VI
③
TO
MA-249
BOARD
(1/5)
(SEE PAGE 4-11)
16

Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

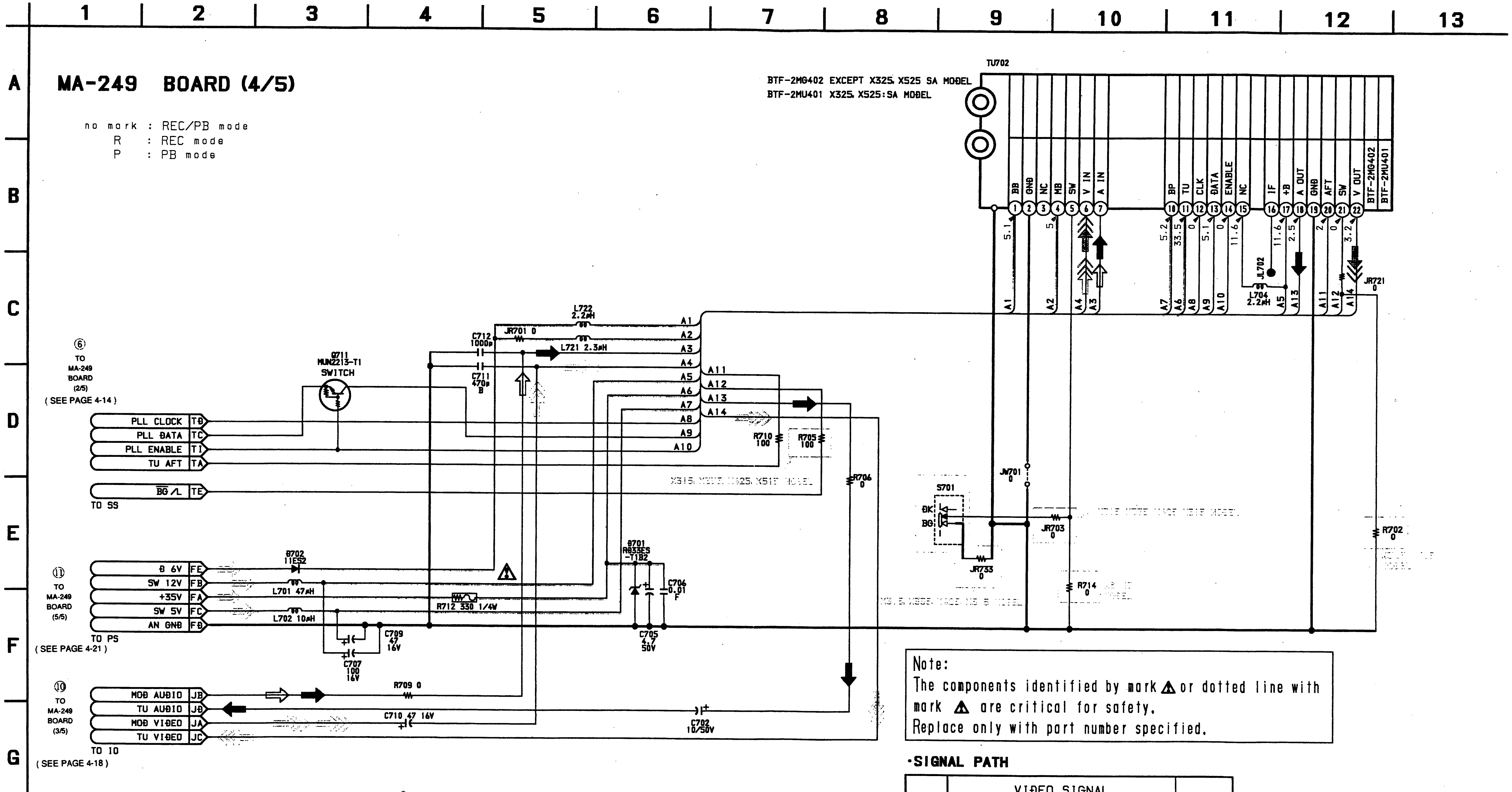
·SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			➡》	➡
PB			⇨》	⇨

MA-249 (TUNER) SCHEMATIC DIAGRAM

— Ref. No. : MA-249 Board: 1,000 Series —

- See page 4-4 to 4-6 for the printed wiring board.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A
B
C
D
E
F
G
H
MA-249 BOARD (4/5)
no mark : REC/PB mode
R : REC mode
P : PB mode
TU702
BTF-2MG402 EXCEPT X325, X525 SA MODEL
BTF-2MU401 X325, X525:SA MODEL
BB
GND
NC
MB
SW
V IN
A IN
BP
TU
CLK
DATA
ENABLE
NC
IF
+B
A OUT
GND
AFT
SW
V OUT
BTF-2MG402
BTF-2MU401
1
2
3
4
5
6
7
10
11
12
13
14
15
16
17
18
19
20
21
22
5.1
5
5.2
33.5
0
5.1
0
11.6
11.6
2.5
2
0
3.2
JL702
L704 2.2µH
JR721 0
A1
A2
A4
A3
A7
A6
A8
A9
A10
A5
A13
A11
A12
A14
⑥
TO MA-249 BOARD (2/5)
(SEE PAGE 4-14)
PLL CLOCK
PLL DATA
PLL ENABLE
TU AFT
TD
TC
TI
TA
BG/L
TE
TO SS
Q711 MUN2213-T1 SWITCH
C712 1000p
JR701 0
L722 2.2µH
L721 2.3µH
C711 470p B
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
R710 100
R705 100
X315, X325, X425, X515 MODEL
R706 0
⑪
TO MA-249 BOARD (5/5)
D 6V
SW 12V
+35V
SW 5V
AN GND
FE
FB
FA
FC
FD
TO PS
(SEE PAGE 4-21)
D702 11ES2
L701 47µH
L702 10µH
R712 330 1/4W
C709 47 16V
C707 100 16V
D701 RD33ES -T1B2
C706 0.01 F
C705 4.7 50V
⑩
TO MA-249 BOARD (3/5)
MOD AUDIO
TU AUDIO
MOD VIDEO
TU VIDEO
JB
JD
JA
JC
TO IO
(SEE PAGE 4-18)
R709 0
C710 47 16V
C702 10/50V
S701
DK
BG
JW701 0
JR703 0
JR733 0
R714 0
R702 0

Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

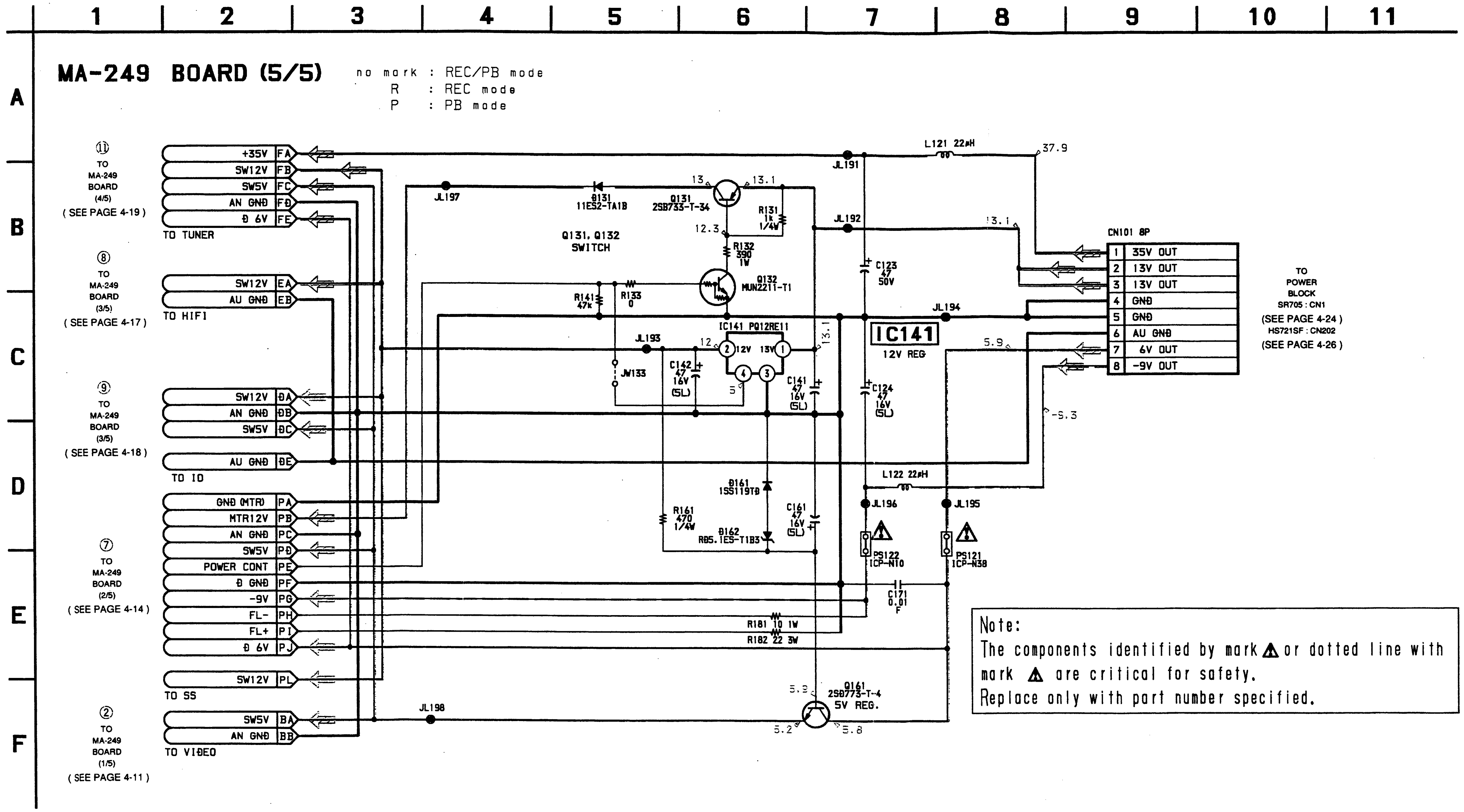
·SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			⇛	➡
PB			⇚	⇨

MA-249 (DC POWER) SCHEMATIC DIAGRAM

— Ref. No. : MA-249 Board: 1,000 Series —

- See page 4-4 to 4-6 for the printed wiring board.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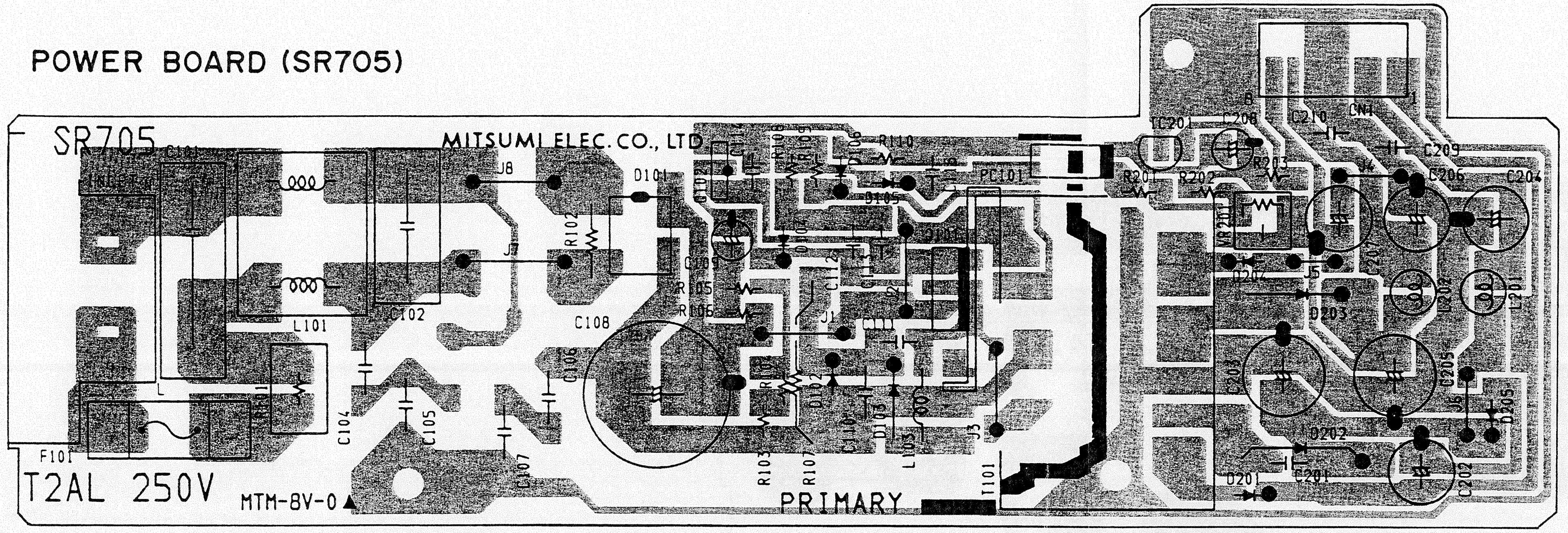
A
B
C
D
E
F
MA-249 BOARD (5/5)
no mark : REC/PB mode
R : REC mode
P : PB mode
⑪ TO MA-249 BOARD (4/5) (SEE PAGE 4-19)
+35V FA
SW12V FB
SW5V FC
AN GND FD
D 6V FE
TO TUNER
⑧ TO MA-249 BOARD (3/5) (SEE PAGE 4-17)
SW12V EA
AU GND EB
TO HIFI
⑨ TO MA-249 BOARD (3/5) (SEE PAGE 4-18)
SW12V DA
AN GND DB
SW5V DC
AU GND DE
TO IO
⑦ TO MA-249 BOARD (2/5) (SEE PAGE 4-14)
GND (MTR) PA
MTR12V PB
AN GND PC
SW5V PD
POWER CONT PE
D GND PF
-9V PG
FL- PH
FL+ PI
D 6V PJ
SW12V PL
TO SS
② TO MA-249 BOARD (1/5) (SEE PAGE 4-11)
SW5V BA
AN GND BB
TO VIDEO
JL197
JL198
D131 11ES2-TA1B
Q131, Q132 SWITCH
Q131 2SB733-T-34
13
13.1
12.3
R131 1k 1/4W
R132 390 1W
Q132 MUN2211-T1
R141 47k
R133 0
JL193
JW133
C142 47 16V (SL)
IC141 PQ12RE11
12
2 12V
13V 1
4
3
5
C141 47 16V (SL)
13.1
D161 1SS119TD
R161 470 1/4W
D162 RD5.1ES-T1B3
C161 47 16V (SL)
R181 10 1W
R182 22 3W
Q161 2SD773-T-4 5V REG.
5.9
5.2
5.8
L121 22μH
37.9
JL191
JL192
13.1
C123 47 50V
JL194
IC141 12V REG
C124 47 16V (SL)
5.9
-9.3
L122 22μH
JL196
JL195
PS122 ICP-N10
PS121 ICP-N38
C171 0.01 F
CN101 8P
1 35V OUT
2 13V OUT
3 13V OUT
4 GND
5 GND
6 AU GND
7 6V OUT
8 -9V OUT
TO POWER BLOCK SR705 : CN1 (SEE PAGE 4-24) HS721SF : CN202 (SEE PAGE 4-26)

Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

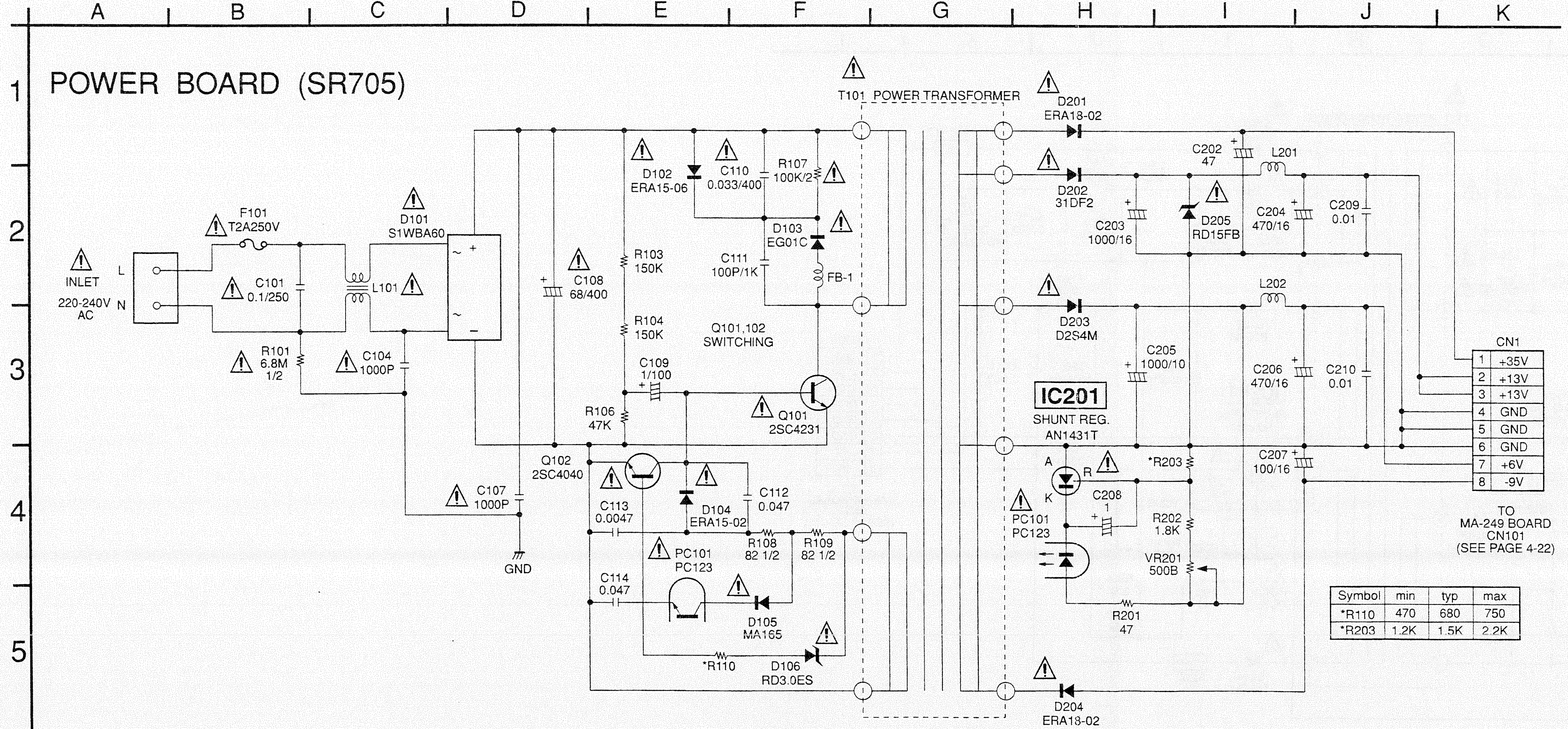
POWER BLOCK (SR705) SCHEMATIC DIAGRAM AND PRINTED WIRING BOARD

— Ref. No. : Power Board: 3,000 Series —

POWER BOARD (SR705)


SR705
MITSUMI ELEC.CO., LTD
F101
T2AL 250V
MTM-8V-0
L101
C102
C104
C105
C106
C107
C108
D101
R101
R102
R103
R105
R106
R107
R110
D102
D103
D104
D105
L103
J1
J3
J8
PC101
T101
PRIMARY
IC201
C201
C202
C203
C204
C205
C206
C207
C208
C209
C210
C212
D201
D202
D203
D205
R201
R202
R203
VR201
L201
L202
J5
CN1

POWER BOARD (SR705)


A
B
C
D
E
F
G
H
I
J
K
1
2
3
4
5
INLET
220-240V AC
L
N
F101
T2A250V
C101
0.1/250
R101
6.8M
1/2
L101
C104
1000P
D101
S1WBA60
C107
1000P
GND
C108
68/400
R103
150K
R104
150K
C109
1/100
R106
47K
Q102
2SC4040
D102
ERA15-06
C110
0.033/400
R107
100K/2
D103
EG01C
C111
100P/1K
FB-1
Q101,102
SWITCHING
Q101
2SC4231
C113
0.0047
D104
ERA15-02
C112
0.047
R108
82 1/2
R109
82 1/2
PC101
PC123
C114
0.047
D105
MA165
*R110
D106
RD3.0ES
T101 POWER TRANSFORMER
D201
ERA18-02
D202
31DF2
C202
47
L201
C203
1000/16
D205
RD15FB
C204
470/16
C209
0.01
L202
D203
D2S4M
C205
1000/10
C206
470/16
C210
0.01
IC201
SHUNT REG.
AN1431T
A
R
K
*R203
C207
100/16
C208
1
PC101
PC123
R202
1.8K
VR201
500B
R201
47
D204
ERA18-02
CN1
1 +35V
2 +13V
3 +13V
4 GND
5 GND
6 GND
7 +6V
8 -9V
TO
MA-249 BOARD
CN101
(SEE PAGE 4-22)

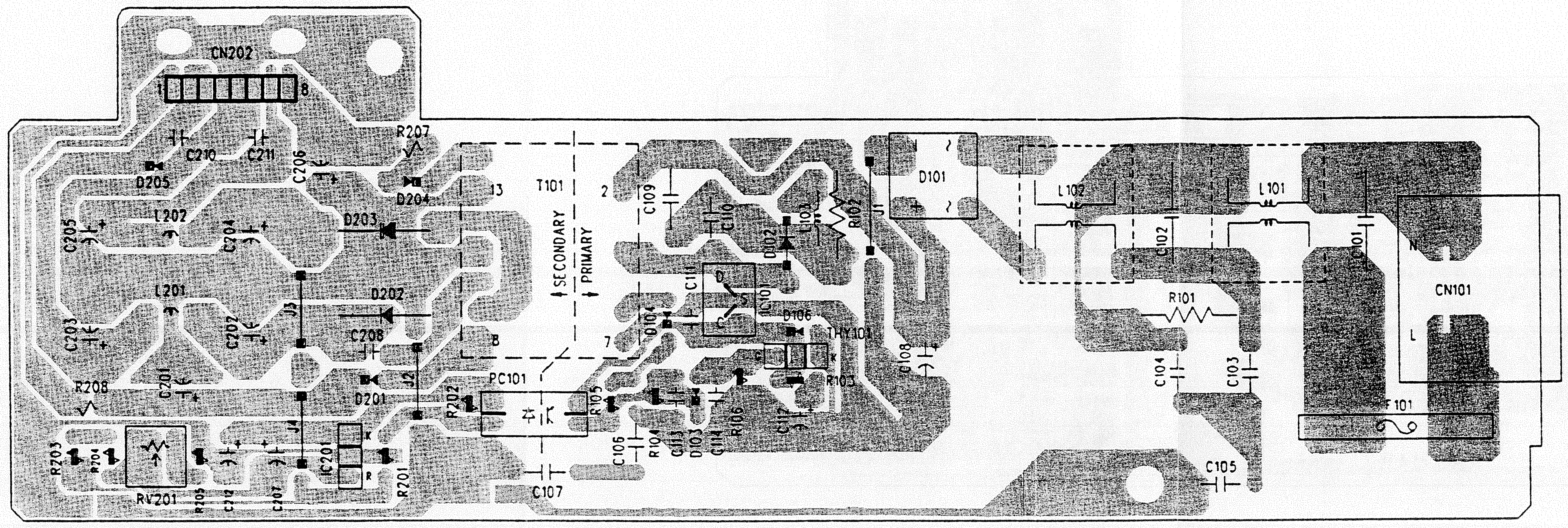
Symbol	min	typ	max
*R110	470	680	750
*R203	1.2K	1.5K	2.2K

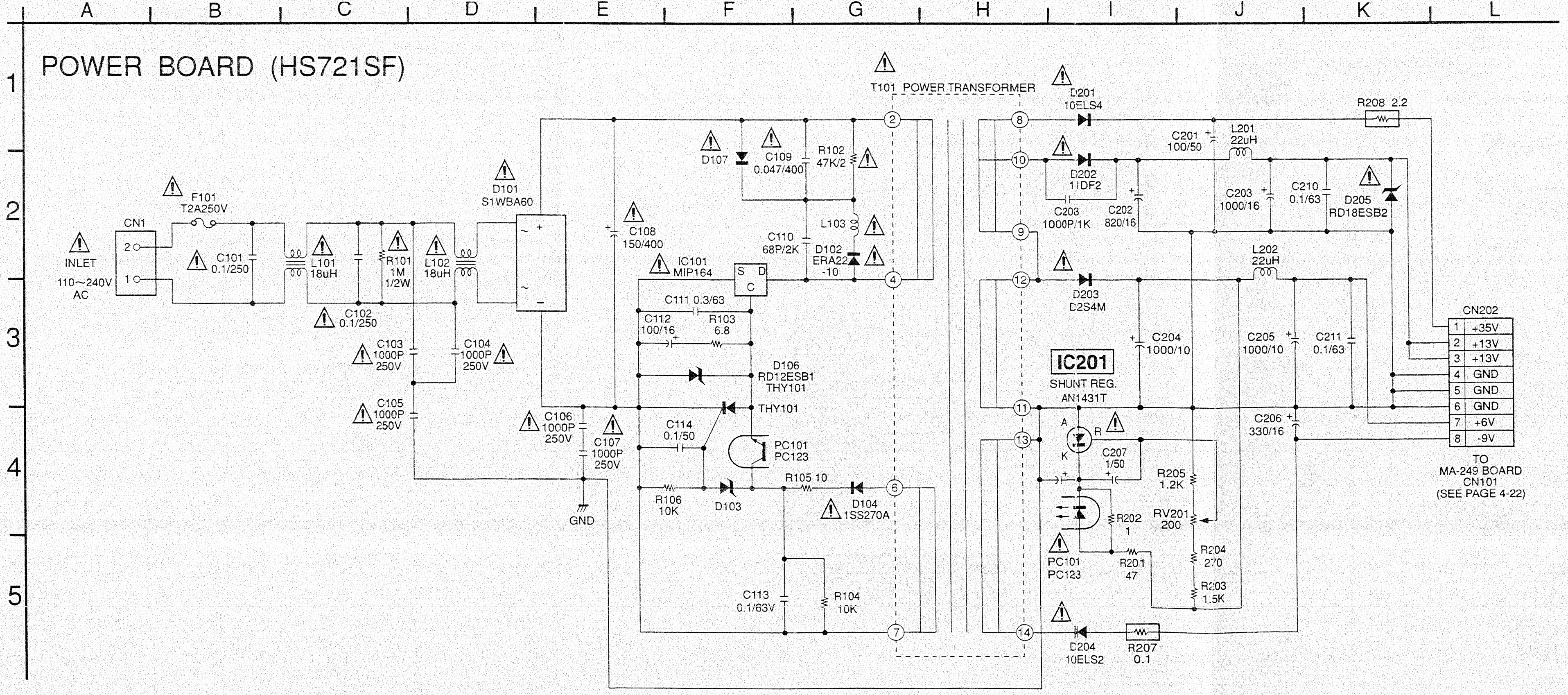
EXCEPT Australian, New Zealand Model

POWER BLOCK (HS721SF) SCHEMATIC DIAGRAM AND PRINTED WIRING BOARD

— Ref. No. : Power Board: 4,000 Series —

POWER BOARD (HS721SF)


CN202
R207
C210
C211
C206
D205
D204
D203
L202
C205
C204
L201
D202
C203
C202
C208
R208
C201
D201
J3
J2
J4
IC201
R202
R201
RV201
R203
R204
R205
C212
C207
T101
SECONDARY
PRIMARY
PC101
R105
C109
C110
D102
R102
D107
J1
C111
C101
D106
THY101
R103
D104
C106
R104
C113
D103
C114
R106
C112
C107
C108
D101
L102
L101
C102
R101
C101
CN101
N
L
C104
C103
C105
F101


A
B
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5
POWER BOARD (HS721SF)
CN1
INLET
110~240V AC
F101 T2A250V
C101 0.1/250
L101 18uH
R101 1M 1/2W
L102 18uH
C102 0.1/250
C103 1000P 250V
C104 1000P 250V
C105 1000P 250V
D101 S1WBA60
C106 1000P 250V
C107 1000P 250V
GND
C108 150/400
IC101 MIP164
D107
C109 0.047/400
R102 47K/2
C110 68P/2K
L103
D102 ERA22-10
C111 0.3/63
C112 100/16
R103 6.8
D106 RD12ESB1 THY101
THY101
C114 0.1/50
PC101 PC123
R106 10K
D103
R105 10
D104 1SS270A
C113 0.1/63V
R104 10K
T101 POWER TRANSFORMER
D201 10ELS4
D202 11DF2
C208 1000P/1K
C202 820/16
C201 100/50
L201 22uH
C203 1000/16
C210 0.1/63
D205 RD18ESB2
R208 2.2
D203 D2S4M
L202 22uH
C204 1000/10
C205 1000/10
C211 0.1/63
IC201
SHUNT REG. AN1431T
C206 330/16
C207 1/50
R205 1.2K
R202 1
RV201 200
R201 47
R204 270
R203 1.5K
PC101 PC123
D204 10ELS2
R207 0.1
CN202
1 +35V
2 +13V
3 +13V
4 GND
5 GND
6 GND
7 +6V
8 -9V
TO MA-249 BOARD CN101 (SEE PAGE 4-22)

TUNER
TU-153, KB-35

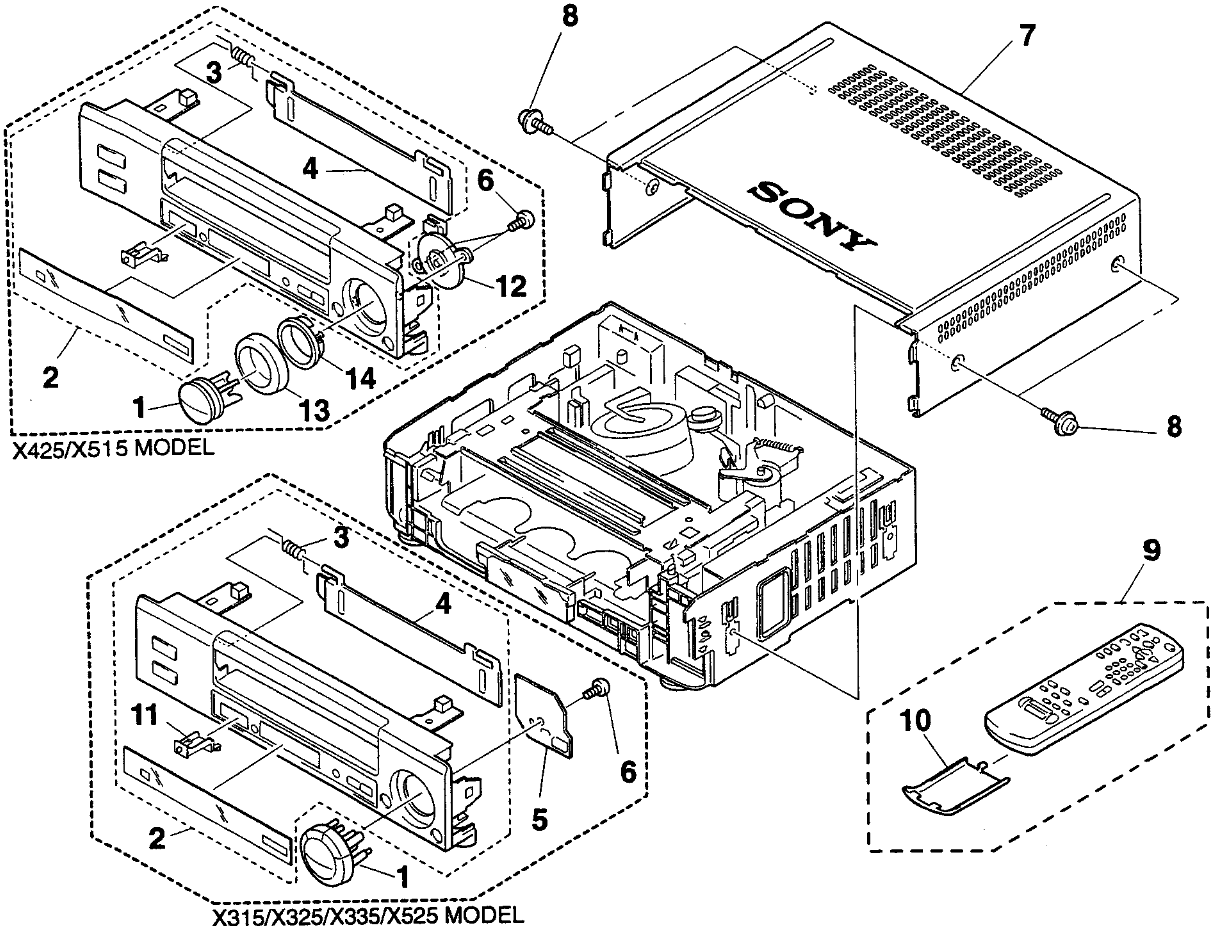
SECTION 5
REPAIR PARTS LIST

5-1. EXPLODED VIEWS

NOTE:
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (#mark) list is given in the last of this parts list.

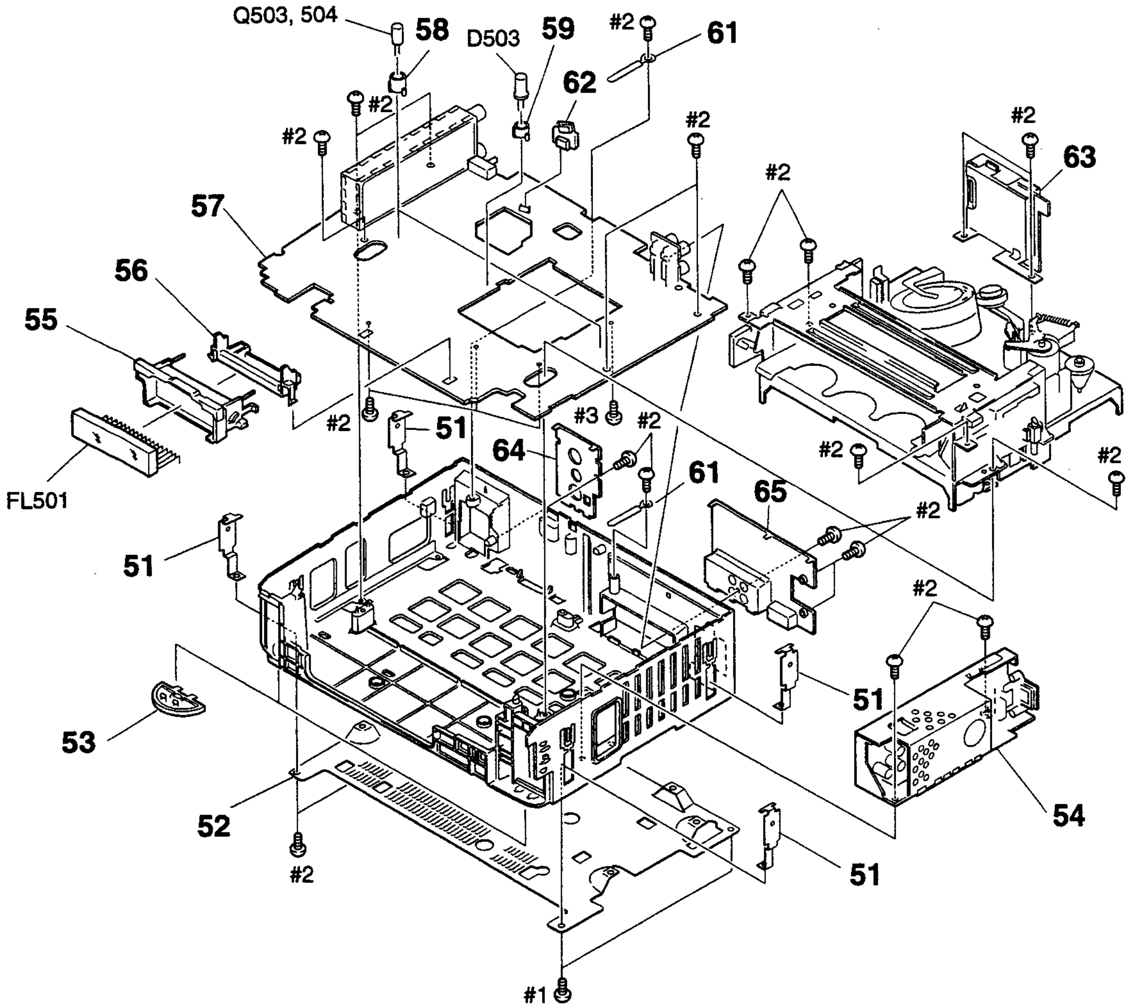
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

5-1-1. FRONT PANEL ASSY



Ref. No.	Part No.	Description	Remarks
1	X-3945-619-1	BUTTON ASSY, FUNCTION (X325:AS,NZ,X525:AS,NZ)	
1	X-3945-621-1	BUTTON ASSY, FUNCTION(X425,X515)	
1	X-3945-714-1	BUTTON ASSY, FUNCTION (X315,X325:SA,X335,X525:SA)	
2	X-3945-704-1	PANEL ASSY, FRONT(X525:AS,NZ)	
2	X-3945-705-1	PANEL ASSY, FRONT(X325:AS,NZ)	
2	X-3945-707-1	PANEL ASSY, FRONT(X515)	
2	X-3945-708-1	PANEL ASSY, FRONT(X425)	
2	X-3945-709-1	PANEL ASSY, FRONT(X315)	
2	X-3945-710-1	PANEL ASSY, FRONT(X335)	
2	X-3945-711-1	PANEL ASSY, FRONT(X525:SA)	
2	X-3945-712-1	PANEL ASSY, FRONT(X325:SA)	
3	3-953-432-01	SPRING (GE), FL	
4	3-966-858-01	DOOR, CASSETTE(X525:AS,NZ)	
4	3-966-858-21	DOOR, CASSETTE(X325:AS,NZ)	
4	3-966-858-51	DOOR, CASSETTE(X515,X525:SA)	
4	3-966-858-81	DOOR, CASSETTE(X315,X325:SA,X335,X425)	
* 5	A-6794-149-A	SW-269 BOARD, COMPLETE (X315,X325,X335,X525)	
6	4-921-277-41	SCREW (B2.6X8), TAPPING, BIND	
* 7	3-966-843-11	CASE, UPPER(X325:AS,NZ,X525:AS, NZ)	
* 7	3-966-843-41	CASE, UPPER (X315,X325:SA,X335,X425,X515 ,X525:SA)	
8	3-710-901-11	SCREW, TAPPING	
8	3-710-901-41	SCREW, TAPPING	
9	1-473-472-31	REMOTE COMMANDER(RMT-V181B)(X515)	
9	1-473-472-41	REMOTE COMMANDER(RMT-V181C)(X525:AS,NZ)	
9	1-473-472-51	REMOTE COMMANDER(RMT-V181D)(X525:SA)	
9	1-473-472-61	REMOTE COMMANDER(RMT-V181E) (X315,X335,X425)	
9	1-473-472-71	REMOTE COMMANDER(RMT-V181F)(X325:SA)	
9	1-473-472-81	REMOTE COMMANDER(RMT-V181G)(X325:AS,NZ)	
10	3-709-062-01	COVER, BATTERY	
11	3-966-889-01	KNOB, SLIDE (X315,X325:AS,NZ,X335, X425,X515,X525:AS,NZ)	
12	1-572-662-71	SWITCH, ROTARY (X425,X515)	
13	3-966-886-01	RING, SHUTTLE (X425 X515)	
14	3-966-890-01	RING, MODE (X425 X515)	

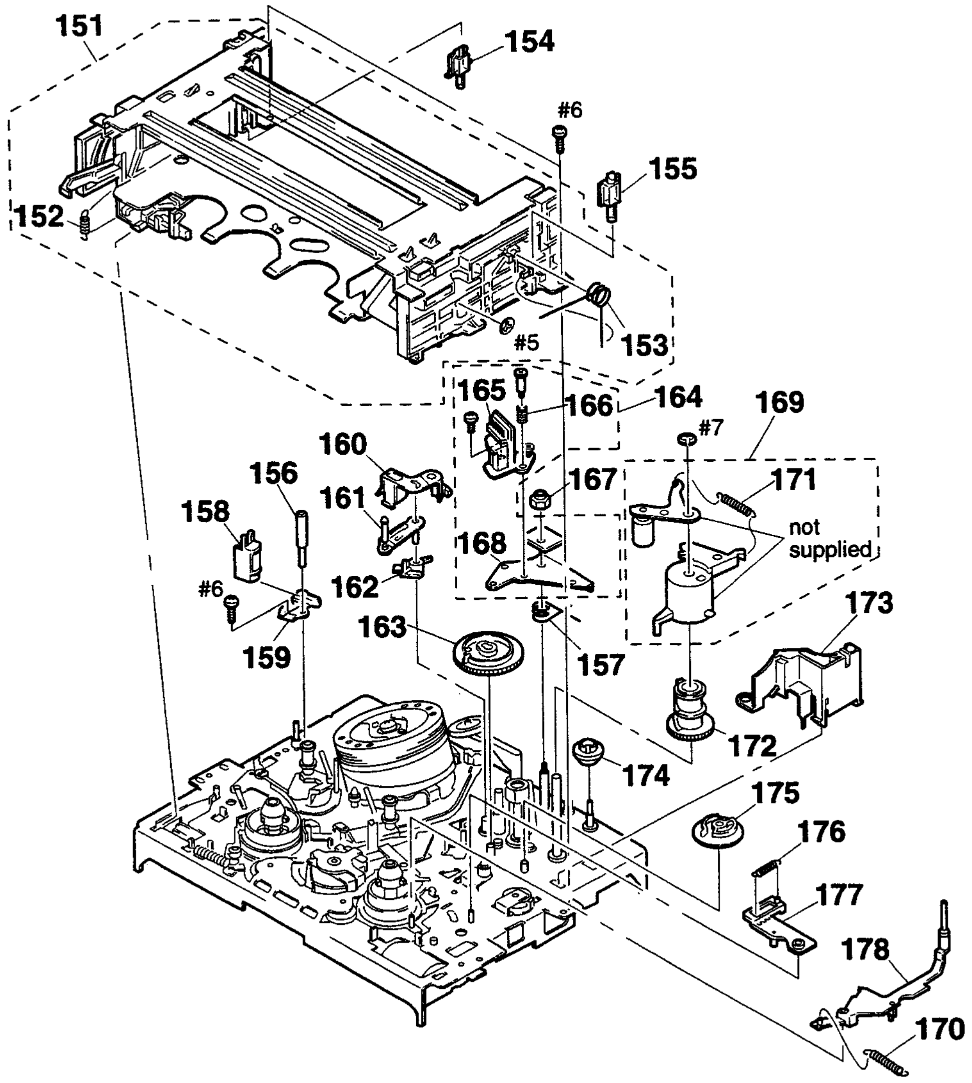
5-1-2. MAIN CHASSIS ASSEMBLY



Ref. No.	Part No.	Description	Remarks
* 51	3-966-872-01	BRACKET, UPPER CASE FITTING	
* 52	3-966-839-01	PLATE, BOTTOM	
53	3-966-842-01	INSULATOR(X325:AS,NZ,X525:AS,NZ)	
53	3-966-842-11	INSULATOR (X315,X325:SA,X335,X425,X515,X525:SA)	
⚠54	1-468-073-11	POWER BLOCK (X315,X325:SA,X335,X425,X515,X525:SA)	
⚠54	1-468-095-11	POWER BLOCK (SR705) (X325:AS,NZ,X525:AS,NZ)	
* 55	3-966-864-01	HOLDER, INDICATION TUBE	
* 56	3-966-865-01	BASE, INDICATION TUBE	
* 57	A-6782-868-A	MA-249 BOARD, COMPLETE (X525:SA)	
* 57	A-6782-869-A	MA-249 BOARD, COMPLETE (X325:AS)	
* 57	A-6782-871-A	MA-249 BOARD, COMPLETE (X525:AS)	
* 57	A-6782-872-A	MA-249 BOARD, COMPLETE (X425)	
* 57	A-6782-873-A	MA-249 BOARD, COMPLETE (X325:SA)	
* 57	A-6782-874-A	MA-249 BOARD, COMPLETE (X335)	
* 57	A-6782-875-A	MA-249 BOARD, COMPLETE (X515)	
* 57	A-6782-877-A	MA-249 BOARD, COMPLETE (X325:NZ)	
* 57	A-6782-879-A	MA-249 BOARD, COMPLETE (X315)	
* 57	A-6782-880-A	MA-249 BOARD, COMPLETE (X525:NZ)	
* 58	3-960-273-01	SPACER, TOP END	
* 59	3-960-274-01	SPACER, LED	
61	3-703-397-01	STOPPER, WIRING	
* 62	A-6794-147-A	DM-46 BOARD, COMPLETE (X515,X525)	
* 63	A-6782-876-A	RP-196 BOARD, COMPLETE (X515,X525)	
* 63	A-6782-878-A	RP-196 BOARD, COMPLETE (X315,X325,X335,X425)	
* 64	3-966-837-41	PLATE,JACK(L),REAR(X315,X335,X425,X515)	
* 64	3-966-837-51	PLATE,JACK(L),REAR(X325,X525)	
* 65	3-966-838-51	PLATE,JACK(R),REAR(X425)	
* 65	3-966-838-61	PLATE,JACK(R),REAR (X315,X325:AS,NZ,X515,X525:AS,NZ)	
* 65	3-966-838-91	PLATE,JACK(R),REAR (X325:SA,X335,X525:SA)	
D503	8-719-048-26	DIODE GL528V1	
FL501	1-517-466-11	TUBE, FLUORESCENT INDICATOR	
Q503	8-729-025-92	PHOTO TRANSISTOR PT380F	
Q504	8-729-025-92	PHOTO TRANSISTOR PT380F	

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

5-1-3. VHS MECHANISM DECK ASSEMBLY-1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Ref. No.	Part No.	Description	Remarks
151	A-6751-496-C	FL BLOCK ASSY	
152	3-958-467-01	SPRING, TENSION COIL	
153	3-958-195-01	SPRING, TORSION	
154	3-960-215-01	PLATE, LIGHT GUIDE, END SENSOR	
155	3-960-216-01	PLATE, LIGHT GUIDE, TOP SENSOR	
156	X-3944-460-1	ROLLER ASSY, TG2	
157	3-958-487-01	SPRING, (AEC) TORSION COIL	
158	1-500-144-11	HEAD, FE	
159	X-3945-348-1	FEH ASSY	
160	3-962-298-01	BRACKET, TG7 TAPE	
161	X-3944-797-1	TG8 ASSY	
162	3-958-421-01	HOLDER, TG8	
163	3-958-152-01	GEAR, TG8	
164	A-6736-103-A	ACE BLOCK ASSY	
165	1-506-485-11	PIN, CONNECTOR 6P	
166	3-960-439-02	SPRING (ACE), COMPRESSION	
167	3-942-867-01	NUT, AC HEIGHT ADJUSTMENT	
168	3-958-491-01	BASE, ACE	
169	A-6746-072-A	PRESS BLOCK ASSY, PINCH	
170	3-958-505-01	SPRING (SOFT BRAKE T), TENSIO	
171	3-958-455-01	SPRING (PINCH), TENSION	
172	3-958-151-01	GEAR, ELEVATOR	
173	3-958-454-01	OPNER, LID	
174	3-958-501-01	SCREW, ACE ADJUSTMENT	
175	3-958-153-01	GEAR, PRESS	
176	3-958-462-01	SPRING (RVS BRAKE), TENSION	
177	X-3943-885-1	ARM ASSY, RVS BRAKE	
178	X-3943-882-1	BRAKE (T) ASSY, SOFT	

5-1-4. VHS MECHANISM DECK ASSEMBLY-2

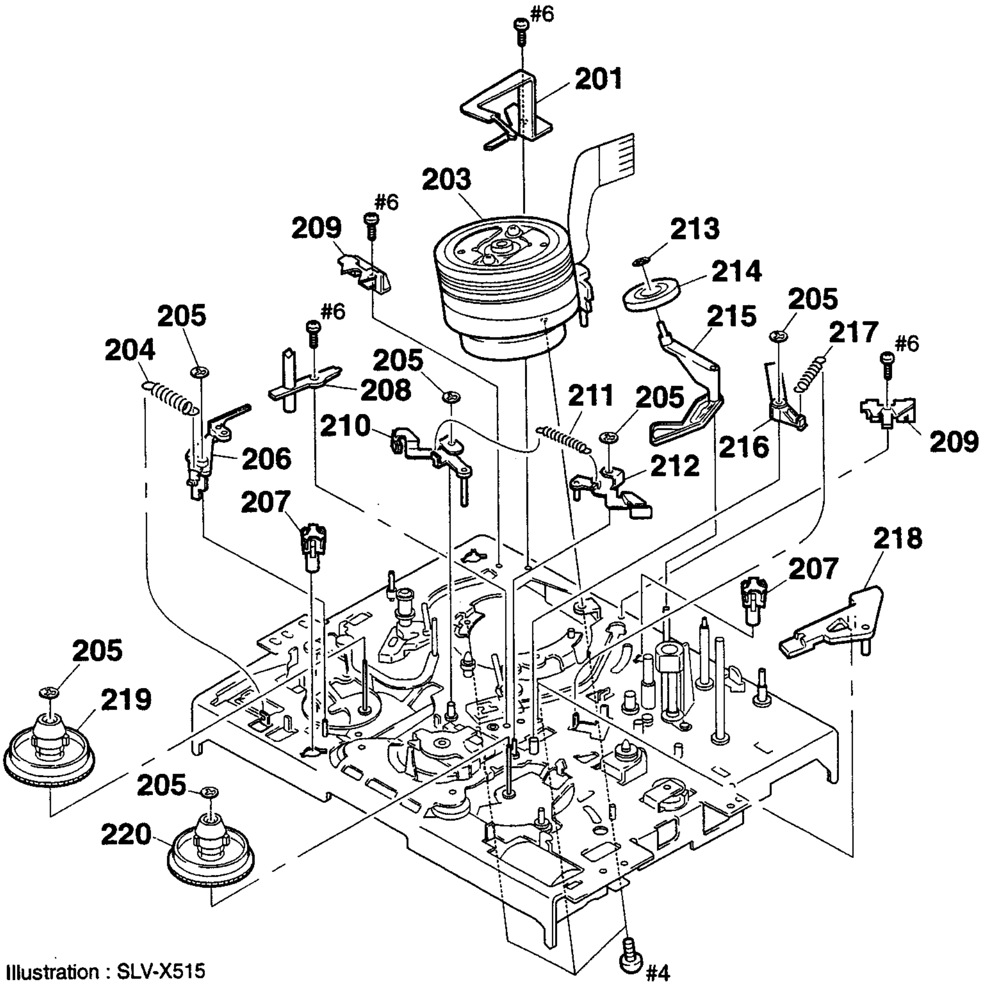
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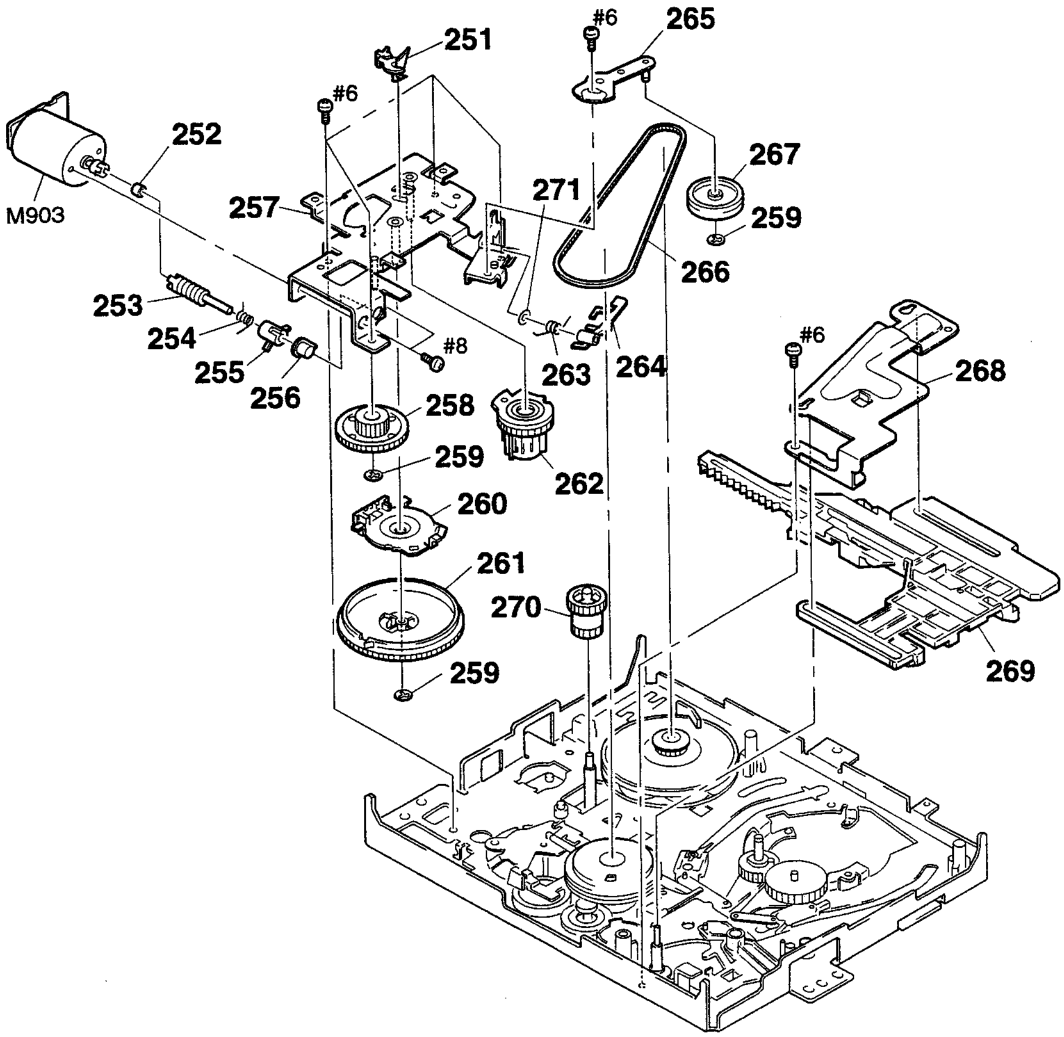
Illustration : SLV-X515

Ref. No.	Part No.	Description	Remarks
201	X-3943-899-5	GROUND ASSY, SHAFT(EXCEPT L2)	
202	2-643-205-01	SCREW	
203	1-759-183-11	DRUM ASSY DZH-78A-R (M901) (X315/X325/X335/X425)	
203	8-848-682-11	DRUM ASSY DZH-74B/Q-RP (M901)(X515/X525)	
204	3-958-443-01	SPRING, STRETCH COIL SPRING	
205	3-669-595-00	WASHER (2), STOPPER	
206	3-958-450-01	BRAKE (S), SOFT	
207	3-958-390-01	SHAFT, PC BOARD	
208	3-958-391-01	PLATE, LIGHT GUIDE, LED	
209	3-958-389-01	CATCHER	
210	X-3945-650-1	BRAKE (S) ASSY, MAIN	
211	3-958-517-01	SPRING, TENSIONCOIL	
212	X-3945-651-1	ARM (T) ASSY, MAIN BRAKE	
213	3-321-393-01	WASHER, STOPPER	
214	X-3944-363-1	ROLLER ASSY, HC	
215	X-3943-896-1	ARM ASSY, HC	
216	3-960-139-01	ARM, NEUTRALITY	
217	3-958-535-01	SPRING, TENSION	
218	3-960-138-01	ARM, PENDULUM COMPULSION	
219	X-3943-902-1	TABLE, REEL (S) ASSY	
220	X-3943-903-1	TABLE, REEL (T) ASSY	
223	3-961-441-01	SCREW (3X8)	

5-1-5. VHS MECHANISM DECK ASSEMBLY-3



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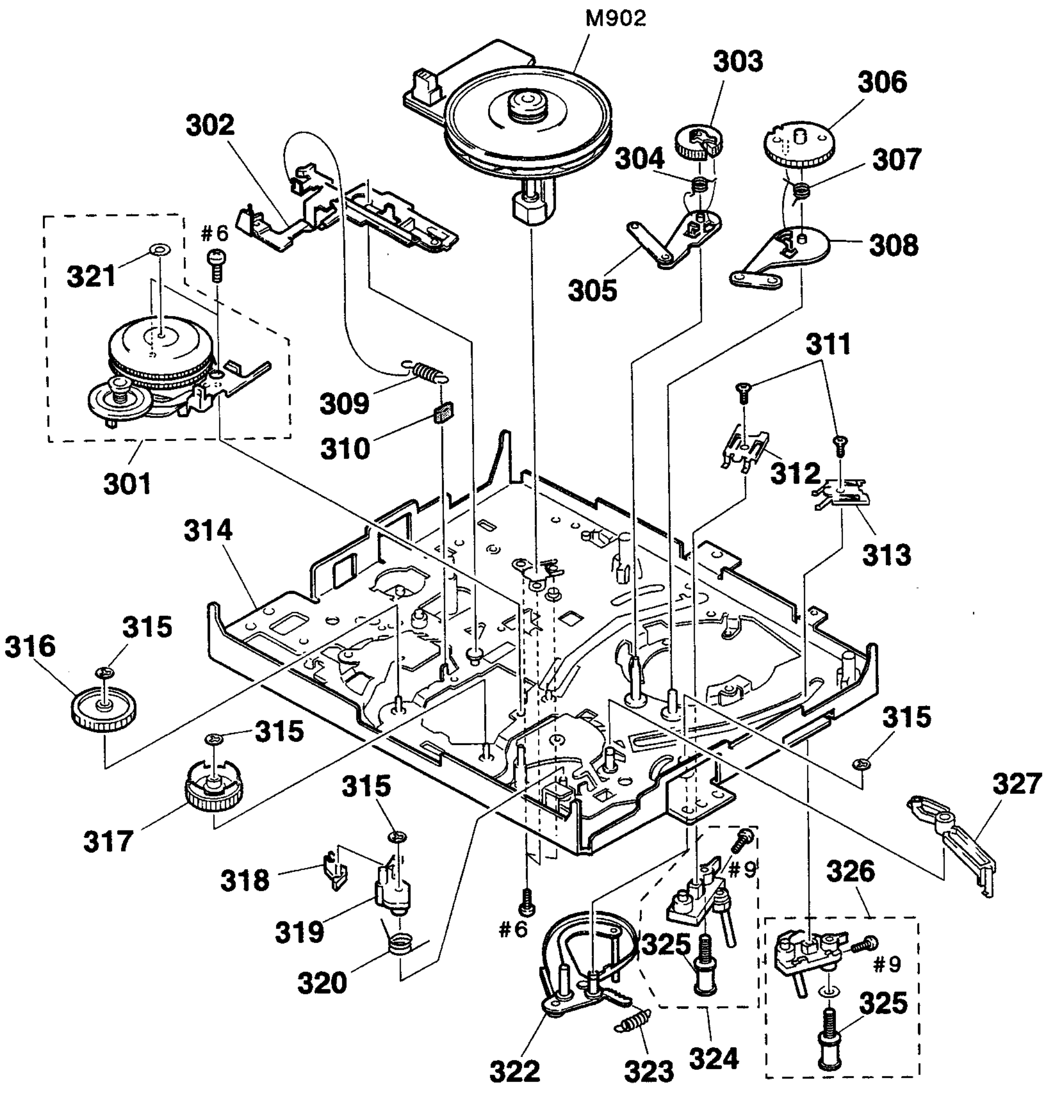
Ref. No.	Part No.	Description	Remarks
251	3-965-977-01	RETAINER, CAM GEAR	
252	3-959-840-11	RUBBER, JOINT	
253	3-958-159-01	WORM	
254	3-958-460-01	SPRING, ONE-WAY	
255	3-958-160-01	PROPELLOR	
256	3-958-155-01	BEARING, CAM MOTOR	
* 257	X-3943-884-1	CHASSIS ASSY, CAM MOTOR	
258	3-958-157-01	WHEEL, WORM	
259	3-669-595-00	WASHER (2), STOPPER	
260	1-762-076-11	SWITCH, ROTARY	
261	3-958-161-04	GEAR, CAM	
262	3-958-156-02	GEAR, FL DRIVING	
263	3-958-445-01	SPRING,TORSIONCOIL(CAP BRAKE)	
264	X-3943-888-1	BRAKE ASSY, CAP	
265	X-3943-889-1	ARM ASSY, TENSION VEHICLE	
266	3-958-361-01	BELT, TIMING	
267	3-958-448-01	WHEEL, TENSION	
* 268	3-959-763-01	RETAINER	
269	3-958-163-04	SLIDER, MAIN	
270	3-958-162-01	GEAR,UPPER/LOWER COMMUNICATIO	
271	3-701-439-21	WASHER	
M903	X-3943-883-1	MOTOR ASSY, CAM	

5-1-6. VHS MECHANISM DECK ASSEMBLY-4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Ref. No.	Part No.	Description	Remarks
301	A-6739-102-A	RKB BLOCK ASSY	
302	X-3943-897-1	LEVER ASSY, TRIGGER	
303	3-958-485-02	GEAR (T), LOADING	
304	3-960-449-01	SPRING (T), TORSION COIL	
305	X-3943-891-1	LEVER (T) ASSY, LOADING	
306	3-958-476-01	GEAR (S), LOADING	
307	3-960-448-01	SPRING (S), TORSION COIL	
308	X-3943-890-1	LEVER (S) ASSY, LOADING	
309	3-958-529-01	SPRING (MOMENT), TENSION	
310	3-959-840-11	RUBBER, JOINT	
311	3-960-720-01	SCREW	
312	3-960-688-01	SPRING, LEAF (T), LOADING	
313	3-960-687-01	SPRING, LEAF (S), LOADING	
314	X-3945-485-1	CHASSIS ASSY, MECHANICAL	
315	3-669-595-00	WASHER (2), STOPPER	
316	3-962-960-01	GEAR (T-K), IDLER	
317	3-962-959-01	GEAR (S-K), IDLER	
318	3-958-533-01	CLAW, S WINDING	
319	3-958-532-01	ARM, S WINDING	
320	3-958-534-01	SPRING, TORSION	
321	3-966-092-01	RING, RETAINING, SLIT WASHER	
322	X-3943-886-1	TG1 ASSY	
323	3-958-492-01	SPRING (TG1), TENSION COIL	
324	A-6750-314-A	T BLOCK ASSY, SHUTTLE	
325	X-3944-378-1	ROLLER ASSY, GUIDE	
326	A-6750-316-A	SHUTTLE (S) BLOCK ASSY	
327	3-958-504-01	ARM, FIXED RELEASE	
328	3-962-874-01	O-RING	
M902	1-698-409-14	MOTOR, DC (CAPSTAN)	

5-2. ELECTRICAL PARTS LIST

NOTE:

When indicating parts by reference number, please include the board name.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- CAPACITORS:
  uF: μF
- RESISTORS
  All resistors are in ohms.
  METAL: metal-film resistor
  METAL OXIDE: Metal Oxide-film resistor
  F: nonflammable
- COILS
  uH: μH
- SEMICONDUCTORS
  In each case, u: μ, for example:
  uA...: μA... , uPA... , μPA... ,
  uPB... , μPB... , uPC... , μPC... ,
  uPD..., μPD...

Ref. No.	Part No.	Description			Remarks
*	A-6794-147-A	DM-46 BOARD, COMPLETE (X515,X525) **********************			
					(Ref.No.2,000 Series)
		< CONNECTOR >			
CN951	1-766-713-11	CONNECTOR, BOARD TO BOAR 5P			
* CN952	1-766-714-11	CONNECTOR, BOARD TO BOAR 5P			
*	A-6782-875-A	MA-249 BOARD, COMPLETE (X515) **********************			
*	A-6782-872-A	MA-249 BOARD, COMPLETE (X425) **********************			
*	A-6782-879-A	MA-249 BOARD, COMPLETE (X315) **********************			
*	A-6782-874-A	MA-249 BOARD, COMPLETE (X335) **********************			
*	A-6782-868-A	MA-249 BOARD, COMPLETE (X525:SA) **********************			
*	A-6782-873-A	MA-249 BOARD, COMPLETE (X325:SA) **********************			
*	A-6782-871-A	MA-249 BOARD, COMPLETE (X525:AS) **********************			
*	A-6782-880-A	MA-249 BOARD, COMPLETE (X525:NZ) **********************			
*	A-6782-869-A	MA-249 BOARD, COMPLETE (X325:AS) **********************			
*	A-6782-877-A	MA-249 BOARD, COMPLETE (X325:NZ) **********************			
					(Ref.No.1,000 Series)
*	3-960-273-01	SPACER, TOP END			
*	3-960-274-01	SPACER, LED			
*	3-966-864-01	HOLDER, INDICATION TUBE			
*	3-966-865-01	BASE, INDICATION TUBE			
		< CAPACITOR >			
C123	1-126-967-11	ELECT	47uF	20%	50V
C124	1-124-589-11	ELECT	47uF	20%	16V
C141	1-124-589-11	ELECT	47uF	20%	16V
C142	1-124-589-11	ELECT	47uF	20%	16V
C161	1-124-589-11	ELECT	47uF	20%	16V
C171	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C201	1-163-033-91	CERAMIC CHIP	0.022uF		50V (X335)
C202	1-163-127-00	CERAMIC CHIP	270PF	5%	50V (X335)
C203	1-126-154-11	ELECT	47uF	20%	6.3V
C204	1-126-157-11	ELECT	10uF	20%	16V
C205	1-126-967-11	ELECT	47uF	20%	10V
C206	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V (X425)
C207	1-164-232-11	CERAMIC CHIP	0.01uF		50V (X315,X335,X425,X515)
C208	1-126-154-11	ELECT	47uF	20%	6.3V (X315,X335,X425,X515)
C209	1-163-031-11	CERAMIC CHIP	0.01uF		50V (X315,X335,X425,X515)
C210	1-126-154-11	ELECT	47uF	20%	6.3V
C211	1-126-967-11	ELECT	47uF	20%	10V (X335)
C212	1-126-967-11	ELECT	47uF	20%	10V (X335)
C214	1-163-124-00	CERAMIC CHIP	200PF	5%	50V (X515,X525)
C214	1-163-257-11	CERAMIC CHIP	180PF	5%	50V (X315,X325,X335,X425)
C215	1-163-231-11	CERAMIC CHIP	15PF	5%	50V (X315,X325,X335,X425)
C216	1-163-224-11	CERAMIC CHIP	7PF	0.25PF	50V (X515,X525)
C216	1-163-089-00	CERAMIC CHIP	6PF		50V (X315,X325,X335,X425)
C221	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C222	1-163-229-11	CERAMIC CHIP	12PF	5%	50V (X425)
C223	1-163-241-11	CERAMIC CHIP	39PF	5%	50V (X515,X525)
C223	1-163-239-11	CERAMIC CHIP	33PF	5%	50V (X315,X325,X335,X425)
C224	1-163-253-11	CERAMIC CHIP	120PF	5%	50V (X515,X525)
C224	1-163-121-00	CERAMIC CHIP	150PF	5%	50V (X315,X325,X335,X425)
C226	1-163-249-11	CERAMIC CHIP	82PF	5%	50V (X515,X525)
C226	1-163-113-00	CERAMIC CHIP	68PF	5%	50V (X315,X325,X335,X425)
C227	1-163-231-11	CERAMIC CHIP	15PF	5%	50V (X315,X325,X335,X425)
C228	1-163-224-11	CERAMIC CHIP	7PF	0.25PF	50V
C229	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C230	1-126-154-11	ELECT	47uF	20%	6.3V
C231	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C233	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C234	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C235	1-163-113-00	CERAMIC CHIP	68PF	5%	50V (X515,X525)
C235	1-163-112-00	CERAMIC CHIP	62PF	5%	50V (X315,X325,X335,X425)
C236	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
C237	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C238	1-163-263-11	CERAMIC CHIP	330PF	5%	50V
C241	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
C242	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
C290	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C291	1-124-464-11	ELECT	0.22uF	20%	50V
C292	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C293	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C294	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C295	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C301	1-126-963-11	ELECT	4.7uF	20%	50V
C302	1-126-160-11	ELECT	1uF	20%	50V
C303	1-128-551-11	ELECT	22uF	20%	25V
C304	1-126-933-11	ELECT	100uF	20%	16V

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Ref. No.	Part No.	Description	Remarks		
C305	1-126-160-11	ELECT	1uF	20%	50V
C306	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C307	1-163-011-11	CERAMIC CHIP	0.0015uF	10%	50V
C308	1-126-160-11	ELECT	1uF	20%	50V
C309	1-126-160-11	ELECT	1uF	20%	50V
C310	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C311	1-104-696-11	FILM	0.015uF	5%	100V
C312	1-124-257-00	ELECT	2.2uF	20%	50V
C313	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C314	1-137-370-11	FILM	0.01uF	5%	50V
C315	1-163-014-00	CERAMIC CHIP	0.0027uF	5%	50V
C316	1-163-143-00	CERAMIC CHIP	0.0012uF	5%	50V
C317	1-137-431-11	FILM	560PF	5%	50V
C318	1-126-163-11	ELECT	4.7uF	20%	50V
C319	1-126-162-11	ELECT	3.3uF	20%	50V
C320	1-124-248-00	ELECT	22uF	20%	35V
C442	1-130-487-00	MYLAR	0.022uF	5%	50V
C443	1-124-499-11	ELECT, NONPOLAR	1uF	20%	50V
C444	1-130-481-00	MYLAR	0.0068uF	5%	50V
C445	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C446	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C448	1-126-154-11	ELECT	47uF	20%	6.3V
C449	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C450	1-126-154-11	ELECT	47uF	20%	6.3V
C451	1-163-245-11	CERAMIC CHIP	56PF	5%	50V
			(X315,X335,X425,X515)		
C452	1-163-102-00	CERAMIC CHIP	24PF	5%	50V
C453	1-163-098-00	CERAMIC CHIP	16PF	5%	50V
C461	1-163-245-11	CERAMIC CHIP	56PF	5%	50V
			(X315,X335,X425,X515)		
C462	1-163-253-11	CERAMIC CHIP	120PF	5%	50V
C463	1-126-160-11	ELECT	1uF	20%	50V
C501	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C502	1-124-584-00	ELECT	100uF	20%	10V
C503	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C504	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C505	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C506	1-126-154-11	ELECT	47uF	20%	6.3V
C507	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C508	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C509	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C510	1-104-905-11	CAPACITOR	0.22F		5.5V
C511	1-104-760-11	CERAMIC CHIP	0.047uF	10%	50V
C512	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C513	1-124-589-11	ELECT	47uF	20%	16V
C521	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C522	1-124-257-00	ELECT	2.2uF	20%	50V
C524	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
C525	1-126-157-11	ELECT	10uF	20%	16V
C526	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C527	1-126-157-11	ELECT	10uF	20%	16V
C528	1-163-023-00	CERAMIC CHIP	0.015uF	5%	50V
C529	1-124-499-11	ELECT, NONPOLAR	1uF	20%	50V
C530	1-126-235-11	ELECT	100uF	20%	6.3V
C532	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V
C553	1-124-589-11	ELECT	47uF	20%	16V
C554	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C555	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C563	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C564	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C565	1-126-157-11	ELECT	10uF	20%	16V
C566	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C567	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C568	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C569	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C580	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C581	1-126-154-11	ELECT	47uF	20%	6.3V
C587	1-104-760-11	CERAMIC CHIP	0.047uF	10%	50V
C590	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C595	1-124-584-00	ELECT	100uF	20%	10V
C596	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C702	1-126-964-11	ELECT	10uF	20%	50V
C705	1-126-963-11	ELECT	4.7uF	20%	50V
C706	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C707	1-126-933-11	ELECT	100uF	20%	16V
C709	1-126-967-11	ELECT	47uF	20%	16V
C710	1-126-967-11	ELECT	47uF	20%	16V
C711	1-163-005-11	CERAMIC CHIP	470PF	10%	50V
C712	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C801	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C802	1-124-589-11	ELECT	47uF	20%	16V
C804	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C805	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C806	1-126-154-11	ELECT	47uF	20%	6.3V
C815	1-126-935-11	ELECT	470uF	20%	6.3V

< CONNECTOR >

CN101	1-569-667-11	CONNECTOR, BOARD TO BOARD 8P
CN201	1-573-844-11	CONNECTOR, BOARD TO BOARD 12P
* CN301	1-560-892-00	PIN, CONNECTOR 4P
* CN501	1-560-891-00	PIN, CONNECTOR 3P
* CN502	1-766-537-11	CONNECTOR (HMD) 5P
* CN503	1-766-716-11	CONNECTOR, BOARD TO BOARD 3P
* CN505	1-766-538-11	CONNECTOR, BOARD TO BOARD 8P
* CN506	1-766-717-11	CONNECTOR, BOARD TO BOARD 5P(X515,X525)
CN508	1-506-473-11	PIN, CONNECTOR 8P(X425,X515)
CN509	1-506-469-11	PIN, CONNECTOR 4P(X315,X325,X335,X525)

< JACK >

CNJ02	1-774-805-11	JACK, PIN 4P (AUDIO/VIDEO)

< DIODE >

⚠D131	8-719-200-82	DIODE	11ES2
D161	8-719-911-19	DIODE	1SS119
D162	8-719-109-86	DIODE	RD5.1ES-B3
D202	8-719-911-19	DIODE	1SS119
D301	8-719-911-19	DIODE	1SS119
D302	8-719-911-19	DIODE	1SS119
D503	8-719-048-26	DIODE	GL528V1
⚠D504	8-719-200-82	DIODE	11ES2
⚠D505	8-719-200-82	DIODE	11ES2
D506	8-719-109-93	DIODE	RD6.2ES-B2
D507	8-719-109-93	DIODE	RD6.2ES-B2
D508	8-719-109-93	DIODE	RD6.2ES-B2
D510	8-719-050-12	DIODE	MPG5304S(STANDBY)
D511	8-719-050-12	DIODE	MPG5304S(STANDBY)
D701	8-719-110-78	DIODE	RD33ES-B2
D702	8-719-200-82	DIODE	11ES2
D809	8-719-109-86	DIODE	RD5.1ES-B3

< FILTER >

FL501	1-517-466-11	TUBE, FLUORESCENT INDICATOR

< TERMINAL >

GB101	1-537-770-21	TERMINAL BOARD, GROUND

< IC >

⚠IC141	8-759-189-48	IC	PQ12RE11
IC201	1-801-153-11	IC	YC MODULE, 3 (PAL)(EXCEPT X425)
IC201	1-801-168-11	IC	YC MODULE 3 (MULTI)(X425)
IC202	1-810-636-11	IC	LA7356M-TLM (X315,X335,X425,X515)
IC203	1-809-959-12	IC	TME656 (X335)
IC301	8-759-268-02	IC	BA7796FS-E2
IC501	8-759-391-36	IC	M37775M5H322GP(X315,X335,X425,X515)

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description	Remarks
IC501	8-759-393-47	IC M37775M7H110GP	(X325,X525)
IC502	8-759-354-30	IC AT24C01A-10SCSL7221	(X315,X335,X425,X515)
IC502	8-759-354-31	IC AT24C02N-10SCSL7221	(X325,X525)
IC503	8-759-248-87	IC MM1256XF-BE	
IC504	8-749-012-26	IC TFMX5400SN	
IC506	8-759-100-96	IC uPC4558G2	
⚠IC508	8-759-353-59	IC LB1643	
IC509	8-759-353-60	IC LC74790M-9105-TLM	
IC511	8-759-100-93	IC uPC393G2	
IC801	8-759-295-66	IC BA7653AF-E2	
		< JUMPER RESISTOR >	
JR001	1-216-295-91	CONDUCTOR, CHIP	(2012)
JR002	1-216-295-91	CONDUCTOR, CHIP	(2012)
JR003	1-216-296-91	CONDUCTOR, CHIP	(3216)
JR534	1-216-295-91	CONDUCTOR, CHIP	(2012) (X315,X325:AS,NZ,X425,X515,X525:AS,NZ)
JR539	1-216-295-91	CONDUCTOR, CHIP	(2012)(X425)
JR701	1-216-295-91	CONDUCTOR, CHIP	(2012)
JR703	1-216-295-91	CONDUCTOR, CHIP	(2012) (X315,X335,X425,X515)
JR721	1-216-295-91	CONDUCTOR, CHIP	(2012)
JR733	1-216-295-91	CONDUCTOR, CHIP	(2012) (X315,X335,X425,X515)
		< COIL >	
L121	1-408-974-21	INDUCTOR	22uH
L122	1-410-667-31	INDUCTOR	22uH
L201	1-408-980-21	INDUCTOR	68uH (X335)
L202	1-408-982-11	INDUCTOR	100uH
L203	1-408-982-11	INDUCTOR	100uH
L204	1-410-514-11	INDUCTOR	27uH (X425)
L205	1-408-982-11	INDUCTOR	100uH (X315,X335,X425,X515)
L206	1-408-982-11	INDUCTOR	100uH
L207	1-408-982-11	INDUCTOR	100uH (X335)
L209	1-408-948-00	INDUCTOR	220uH (X515,X525)
L209	1-408-985-21	INDUCTOR	180uH (X315,X325,X335,X425)
L210	1-410-512-11	INDUCTOR	18uH (X315,X325,X335,X425)
L212	1-410-515-11	INDUCTOR	33uH
L213	1-410-516-11	INDUCTOR	39uH
L214	1-410-511-11	INDUCTOR	15uH
L215	1-410-511-11	INDUCTOR	15uH
L216	1-408-982-11	INDUCTOR	100uH
L218	1-408-977-21	INDUCTOR	39uH
L301	1-410-687-11	INDUCTOR	1.2mH
L302	1-408-970-21	INDUCTOR	10uH
L401	1-408-982-11	INDUCTOR	100uH
L441	1-410-513-11	INDUCTOR	22uH (X315,X335,X425,X515)
L450	1-408-982-11	INDUCTOR	100uH
L503	1-408-970-21	INDUCTOR	10uH
L505	1-408-982-11	INDUCTOR	100uH
L506	1-410-501-11	INDUCTOR	2.2uH
L510	1-408-970-21	INDUCTOR	10uH
L581	1-408-970-21	INDUCTOR	10uH
L701	1-408-978-21	INDUCTOR	47uH
L702	1-408-970-21	INDUCTOR	10uH
L704	1-410-501-11	INDUCTOR	2.2uH
L721	1-410-501-11	INDUCTOR	2.2uH
L722	1-410-501-11	INDUCTOR	2.2uH
L801	1-410-501-11	INDUCTOR	2.2uH
L803	1-408-982-11	INDUCTOR	100uH
L805	1-408-982-11	INDUCTOR	100uH
		< PHOTO INTERUPTER >	
PH501	8-749-010-20	PHOTO INTERRUPTER GP3S114	
PH502	8-749-010-19	PHOTO INTERRUPTER GP3S113	

Ref. No.	Part No.	Description	Remarks
		< IC LINK >	
⚠PS121	1-532-675-21	LINK, IC	1.5A
⚠PS122	1-532-605-00	LINK, IC	0.4A
⚠PS301	1-532-727-11	LINK, IC	0.25A
⚠PS501	1-532-727-11	LINK, IC	0.25A
		< TRANSISTOR >	
⚠Q131	8-729-140-93	TRANSISTOR	2SB733-34
Q132	8-729-421-22	TRANSISTOR	UN2211
⚠Q161	8-729-140-98	TRANSISTOR	2SD773
Q201	8-729-421-19	TRANSISTOR	UN2213 (X335)
Q202	8-729-421-19	TRANSISTOR	UN2213 (X335)
Q203	8-729-901-06	TRANSISTOR	DTA144EK (X315,X325,X425,X515,X525)
Q205	8-729-901-06	TRANSISTOR	DTA144EK (X335)
Q209	8-729-421-19	TRANSISTOR	UN2213 (X515,X525)
Q210	8-729-421-19	TRANSISTOR	UN2213 (X515,X525)
Q211	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q212	8-729-216-21	TRANSISTOR	2SA1162Y-TE85L
Q214	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q215	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q216	8-729-421-19	TRANSISTOR	UN2213 (X425)
Q219	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q220	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L (X315,X335,X425,X515)
Q253	8-729-901-06	TRANSISTOR	DTA144EK
Q290	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q301	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q302	8-729-900-51	TRANSISTOR	DTA114TK
Q303	8-729-012-31	TRANSISTOR	2SC4040-TL2-Q
Q304	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q401	8-729-216-21	TRANSISTOR	2SA1162Y-TE85L
Q403	8-729-216-21	TRANSISTOR	2SA1162Y-TE85L
Q502	8-729-281-53	TRANSISTOR	2SC1815-GR
Q503	8-729-025-92	PHOTO TRANSISTOR	PT380F
Q504	8-729-025-92	PHOTO TRANSISTOR	PT380F
Q591	8-729-421-22	TRANSISTOR	UN2211
Q711	8-729-421-19	TRANSISTOR	UN2213
Q801	8-729-119-76	TRANSISTOR	2SA1175-HFE
		< RESISTOR >	
R131	1-249-417-11	CARBON	1K 5% 1/4W F
⚠R132	1-216-430-11	METAL OXIDE	390 5% 1W F
R133	1-216-295-91	CONDUCTOR, CHIP	(2012)
R141	1-216-089-91	METAL GLAZE	47K 5% 1/10W
R161	1-249-413-11	CARBON	470 5% 1/4W F
⚠R181	1-215-857-11	METAL OXIDE	10 5% 1W F
⚠R182	1-215-907-11	METAL OXIDE	22 5% 3W F
R201	1-216-295-91	CONDUCTOR, CHIP	(2012) (X515,X525)
R202	1-216-295-91	CONDUCTOR, CHIP	(2012) (X315,X325,X335,X425)
R203	1-216-073-00	METAL CHIP	10K 5% 1/10W(X335)
R204	1-216-295-91	CONDUCTOR, CHIP	(2012) (EXCEPT X335)
R204	1-216-041-00	METAL CHIP	470 5% 1/10W(X335)
R208	1-216-295-91	CONDUCTOR, CHIP	(2012)
R209	1-216-049-91	METAL GLAZE	1K 5% 1/10W
R213	1-216-041-00	METAL CHIP	470 5% 1/10W (X315,X335,X425,X515)
R214	1-216-057-00	METAL CHIP	2.2K 5% 1/10W (X315,X335,X425,X515)
R215	1-216-065-00	METAL CHIP	4.7K 5% 1/10W (X315,X335,X425,X515)
R216	1-216-049-91	METAL GLAZE	1K 5% 1/10W (X315,X335,X425,X515)
R217	1-216-295-91	CONDUCTOR, CHIP	(2012) (X315,X335,X515)
R218	1-216-295-91	CONDUCTOR, CHIP	(2012) (X425)
R219	1-216-073-00	METAL CHIP	10K 5% 1/10W(X335)
R220	1-208-798-11	METAL GLAZE	4.7K 0.50% 1/10W

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

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Ref. No.	Part No.	Description			Remarks
R221	1-216-054-00	METAL GLAZE	1.6K	5%	1/10W (X515,X525)
R221	1-216-055-00	METAL CHIP	1.8K	5%	1/10W (X315,X325,X335,X425)
R222	1-216-295-91	CONDUCTOR, CHIP			(2012)
R227	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R228	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R229	1-216-047-91	METAL GLAZE	820	5%	1/10W
R230	1-216-081-00	METAL CHIP	22K	5%	1/10W
R231	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R232	1-216-041-00	METAL CHIP	470	5%	1/10W
R233	1-216-045-00	METAL CHIP	680	5%	1/10W
R234	1-216-050-00	METAL GLAZE	1.1K	5%	1/10W
R235	1-216-041-00	METAL CHIP	470	5%	1/10W
R236	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R237	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R238	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R239	1-216-041-00	METAL CHIP	470	5%	1/10W
R240	1-216-041-00	METAL CHIP	470	5%	1/10W
R241	1-216-047-91	METAL GLAZE	820	5%	1/10W
R242	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R243	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R244	1-216-045-00	METAL CHIP	680	5%	1/10W
R245	1-216-041-00	METAL CHIP	470	5%	1/10W
R246	1-216-043-91	METAL GLAZE	560	5%	1/10W
R247	1-216-049-91	METAL GLAZE	1K	5%	1/10W (X515,X525)
R247	1-216-045-00	METAL CHIP	680	5%	1/10W (X315,X325,X335,X425)
R248	1-216-045-00	METAL CHIP	680	5%	1/10W (X515,X525)
R249	1-216-073-00	METAL CHIP	10K	5%	1/10W (X515,X525)
R250	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R251	1-216-041-00	METAL CHIP	470	5%	1/10W
R271	1-216-295-91	CONDUCTOR, CHIP			(2012) (EXCEPT X425)
R272	1-216-069-00	METAL CHIP	6.8K	5%	1/10W(X425)
R275	1-216-295-91	CONDUCTOR, CHIP			(2012)
R278	1-216-073-00	METAL CHIP	10K	5%	1/10W
R285	1-216-073-00	METAL CHIP	10K	5%	1/10W
R286	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R287	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R288	1-216-073-00	METAL CHIP	10K	5%	1/10W
R290	1-216-081-00	METAL CHIP	22K	5%	1/10W
R291	1-216-099-00	METAL CHIP	120K	5%	1/10W
R292	1-216-095-00	METAL CHIP	82K	5%	1/10W
R293	1-216-073-00	METAL CHIP	10K	5%	1/10W
R294	1-216-073-00	METAL CHIP	10K	5%	1/10W
R295	1-216-077-00	METAL CHIP	15K	5%	1/10W
R296	1-216-077-00	METAL CHIP	15K	5%	1/10W
R298	1-216-097-91	METAL GLAZE	100K	5%	1/10W
R301	1-216-001-00	METAL CHIP	10	5%	1/10W
R302	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R303	1-216-097-91	METAL GLAZE	100K	5%	1/10W
R304	1-216-043-91	METAL GLAZE	560	5%	1/10W
R305	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R306	1-216-093-00	METAL CHIP	68K	5%	1/10W
R307	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R308	1-216-093-00	METAL CHIP	68K	5%	1/10W
R309	1-216-129-00	METAL CHIP	2.2M	5%	1/10W
R310	1-216-081-00	METAL CHIP	22K	5%	1/10W (EXCEPT X425)
R310	1-216-079-00	METAL CHIP	18K	5%	1/10W(X425)
R311	1-216-304-11	METAL CHIP	3.3	5%	1/10W
R312	1-216-065-00	METAL CHIP	4.7K	5%	1/10W (EXCEPT X325:AS)
R313	1-216-083-00	METAL CHIP	27K	5%	1/10W (EXCEPT X425)
R313	1-216-089-91	METAL GLAZE	47K	5%	1/10W(X425)
R314	1-216-075-00	METAL CHIP	12K	5%	1/10W
R315	1-216-081-00	METAL CHIP	22K	5%	1/10W
R316	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (EXCEPT X425)
R316	1-216-071-00	METAL CHIP	8.2K	5%	1/10W(X425)
R317	1-216-073-00	METAL CHIP	10K	5%	1/10W
R318	1-216-073-00	METAL CHIP	10K	5%	1/10W (EXCEPT X425)
R318	1-216-071-00	METAL CHIP	8.2K	5%	1/10W(X425)
R319	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R320	1-216-109-00	METAL CHIP	330K	5%	1/10W
R321	1-216-073-00	METAL CHIP	10K	5%	1/10W
R322	1-216-085-00	METAL CHIP	33K	5%	1/10W
R323	1-216-073-00	METAL CHIP	10K	5%	1/10W
R324	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R325	1-216-099-00	METAL CHIP	120K	5%	1/10W
R326	1-216-041-00	METAL CHIP	470	5%	1/10W
R402	1-216-057-00	METAL CHIP	2.2K	5%	1/10W (EXCEPT X325:NZ,X525:NZ)
R403	1-216-073-00	METAL CHIP	10K	5%	1/10W (X325:AS,NZ,X525:AS,NZ)
R404	1-216-073-00	METAL CHIP	10K	5%	1/10W (X325:SA,X525:SA)
R408	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R411	1-216-073-00	METAL CHIP	10K	5%	1/10W
R412	1-216-073-00	METAL CHIP	10K	5%	1/10W
R421	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R422	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R423	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R424	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R425	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R426	1-216-295-91	CONDUCTOR, CHIP			(2012)
R431	1-216-295-91	CONDUCTOR, CHIP			(2012) (X315,X325:AS,NZ,X425,X515,X525:AS,NZ)
R432	1-216-295-91	CONDUCTOR, CHIP			(2012) (X315,X325:AS,NZ,X425,X515,X525:AS,NZ)
R441	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R442	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R443	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R444	1-216-013-00	METAL CHIP	33	5%	1/10W
R450	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R451	1-216-049-91	METAL GLAZE	1K	5%	1/10W (X315,X335,X425,X515)
R453	1-216-041-00	METAL CHIP	470	5%	1/10W
R454	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R455	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R457	1-216-295-91	CONDUCTOR, CHIP			(2012)
R471	1-216-073-00	METAL CHIP	10K	5%	1/10W
R472	1-216-295-91	CONDUCTOR, CHIP			(2012)
R473	1-216-073-00	METAL CHIP	10K	5%	1/10W
R474	1-216-041-00	METAL CHIP	470	5%	1/10W
R475	1-216-041-00	METAL CHIP	470	5%	1/10W
R476	1-216-041-00	METAL CHIP	470	5%	1/10W
R477	1-216-041-00	METAL CHIP	470	5%	1/10W
R478	1-216-041-00	METAL CHIP	470	5%	1/10W
R480	1-216-689-11	METAL CHIP	39K	0.5%	1/10W (EXCEPT X325:SA,X525:SA)
R501	1-216-073-00	METAL CHIP	10K	5%	1/10W
R502	1-216-073-00	METAL CHIP	10K	5%	1/10W
R503	1-216-073-00	METAL CHIP	10K	5%	1/10W
R504	1-216-073-00	METAL CHIP	10K	5%	1/10W
R505	1-216-121-91	METAL GLAZE	1M	5%	1/10W
R506	1-216-041-00	METAL CHIP	470	5%	1/10W
R507	1-218-179-11	METAL GLAZE	10M	5%	1/10W
R508	1-216-089-91	METAL GLAZE	47K	5%	1/10W (EXCEPT X325)
R509	1-216-001-00	METAL CHIP	10	5%	1/10W
R510	1-216-113-00	METAL CHIP	470K	5%	1/10W
R511	1-216-105-91	METAL GLAZE	220K	5%	1/10W
R513	1-216-073-00	METAL CHIP	10K	5%	1/10W
R514	1-216-073-00	METAL CHIP	10K	5%	1/10W (X315,X335,X515,X525)
R514	1-216-089-91	METAL GLAZE	47K	5%	1/10W (X325:AS,NZ)
R515	1-216-061-00	METAL CHIP	3.3K	5%	1/10W(X515)
R515	1-216-073-00	METAL CHIP	10K	5%	1/10W (X325:SA,X425:AS,ME)
R515	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (X315,X335)
R515	1-216-089-91	METAL GLAZE	47K	5%	1/10W (X325:AS,NZ)

Ref. No.	Part No.	Description			Remarks
R516	1-216-085-00	METAL CHIP	33K	5%	1/10W
R517	1-216-083-00	METAL CHIP	27K	5%	1/10W
R518	1-216-033-00	METAL CHIP	220	5%	1/10W
R519	1-216-033-00	METAL CHIP	220	5%	1/10W
R521	1-216-073-00	METAL CHIP	10K	5%	1/10W
R522	1-216-095-00	METAL CHIP	82K	5%	1/10W
R523	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R524	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R525	1-216-121-91	METAL GLAZE	1M	5%	1/10W
R526	1-216-045-00	METAL CHIP	680	5%	1/10W
R527	1-216-117-00	METAL CHIP	680K	5%	1/10W
R528	1-216-073-00	METAL CHIP	10K	5%	1/10W
R529	1-216-073-00	METAL CHIP	10K	5%	1/10W
R530	1-216-093-00	METAL CHIP	68K	5%	1/10W
R531	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R532	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R533	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R534	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R537	1-216-067-00	METAL CHIP	5.6K	5%	1/10W (X515,X425,X315,X525:SA,X325:SA)
R538	1-216-067-00	METAL CHIP	5.6K	5%	1/10W (X335,X525:AS,NZ,X325:AS,NZ)
R540	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R541	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R551	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R552	1-216-081-00	METAL CHIP	22K	5%	1/10W
R553	1-216-073-00	METAL CHIP	10K	5%	1/10W
R558	1-216-075-00	METAL CHIP	12K	5%	1/10W
R559	1-216-081-00	METAL CHIP	22K	5%	1/10W
R561	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R562	1-216-033-00	METAL CHIP	220	5%	1/10W
R563	1-216-033-00	METAL CHIP	220	5%	1/10W
R564	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R565	1-216-113-00	METAL CHIP	470K	5%	1/10W
R566	1-216-113-00	METAL CHIP	470K	5%	1/10W
R567	1-247-807-31	CARBON	100	5%	1/4W
R568	1-247-807-31	CARBON	100	5%	1/4W
R569	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R570	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R571	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R572	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R573	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R574	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R575	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R576	1-216-295-91	CONDUCTOR, CHIP		(	2012)
R578	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R579	1-216-053-00	METAL CHIP	1.5K	5%	1/10W (X425,X515)
R581	1-216-073-00	METAL CHIP	10K	5%	1/10W
R582	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R583	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R584	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R585	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R586	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R587	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (EXCEPT X325:SA,X525:SA)
R588	1-216-077-00	METAL CHIP	15K	5%	1/10W (EXCEPT X325:SA,X525:SA)
R589	1-216-053-00	METAL CHIP	1.5K	5%	1/10W (X425,X515)
R590	1-216-073-00	METAL CHIP	10K	5%	1/10W
R591	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R592	1-216-073-00	METAL CHIP	10K	5%	1/10W
R593	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R594	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R595	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R596	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (X315,X325:AS,NZ,X425,X515,X525:AS,NZ)
R597	1-216-077-00	METAL CHIP	15K	5%	1/10W(X425)
R599	1-216-073-00	METAL CHIP	10K	5%	1/10W
R702	1-216-295-91	CONDUCTOR, CHIP		(	2012) (X325,X525)
R705	1-216-025-91	METAL GLAZE	100	5%	1/10W (X315,X335,X425,X515)
R706	1-216-295-91	CONDUCTOR, CHIP		(	2012)
R709	1-216-295-91	CONDUCTOR, CHIP		(	2012)
R710	1-216-025-91	METAL GLAZE	100	5%	1/10W
⚠R712	1-212-893-00	FUSIBLE	330	5%	1/4W F
R714	1-216-295-91	CONDUCTOR, CHIP		(	2012) (X325:AS,NZ,X525:AS,NZ)
R802	1-216-022-00	METAL CHIP	75	5%	1/10W
R803	1-208-754-11	METAL GLAZE	68	0.50%	1/10W
R804	1-216-295-91	CONDUCTOR, CHIP		(	2012)
R805	1-216-043-91	METAL GLAZE	560	5%	1/10W
R809	1-216-017-91	METAL GLAZE	47	5%	1/10W
R811	1-249-407-11	CARBON	150	5%	1/4W F
R812	1-249-407-11	CARBON	150	5%	1/4W F
R813	1-216-017-91	METAL GLAZE	47	5%	1/10W
R814	1-216-017-91	METAL GLAZE	47	5%	1/10W

< SWITCH >

S501	1-570-953-11	SWITCH, PUSH (1 KEY)	
S502	1-571-532-32	SWITCH, TACTIL (STANDBY)	
S503	1-571-532-32	SWITCH, TACTIL (EJECT)	
S504	1-571-532-32	SWITCH, TACTIL (REC)	
S506	1-571-532-32	SWITCH, TACTIL (PROGRAM +)	
S507	1-572-907-11	SWITCH, SLIDE (NTSC PB)	(EXCEPT X325:SA,X525:SA)
S511	1-571-532-32	SWITCH, TACTIL (PAUSE)	
S512	1-571-532-32	SWITCH, TACTIL (PROGRAM -)	
S513	1-762-211-11	SWITCH, SLIDE (COLOR SYSTEM)	(X315,X325:AS,NZ,X515,X525:AS,NZ)
S513	1-762-207-11	SWITCH, SLIDE (COLOR SYSTEM)	(X425)
S701	1-571-588-11	SWITCH, SLIDE (TV SYSTEM)	(X315,X335,X425,X515)

< TRANSFORMER >

T301	1-423-414-11	TRANSFORMER, BIAS OSCILLATION
T401	1-233-527-11	FILTER, TRAP

< TUNER >

TU702	1-693-319-11	TUNER (BTF-2MG402)	(X315,X325:AS,NZ,X335,X425,X515,X525:AS,NZ)
TU702	1-693-329-11	TUNER (BTF-2MU401)	(X325:SA,X525:SA)

< VIBRATOR >

X501	1-760-494-11	VIBRATOR, CRYSTAL 16MHz
X502	1-579-463-11	VIBRATOR, CRYSTAL 32KHz
X541	1-577-289-11	VIBRATOR, CRYSTAL 17.73MHz

* A-6782-876-A RP-196 BOARD, COMPLETE(X515,X525)
****

* A-6782-878-A RP-196 BOARD, COMPLETE
****
(X315,X325,X335,X425)
(Ref.No.2,000 Series)

3-966-840-02 CASE, SHIELD (MAIN) (PAL), RP

< CAPACITOR >

C001	1-163-033-91	CERAMIC CHIP	0.022uF	50V	
C002	1-163-033-91	CERAMIC CHIP	0.022uF	50V	
C004	1-163-033-91	CERAMIC CHIP	0.022uF	50V	
C005	1-163-033-91	CERAMIC CHIP	0.022uF	50V	
C006	1-163-033-91	CERAMIC CHIP	0.022uF	50V	
C007	1-163-033-91	CERAMIC CHIP	0.022uF	50V	
C008	1-163-033-91	CERAMIC CHIP	0.022uF	50V	(X515,X525)
C010	1-163-033-91	CERAMIC CHIP	0.022uF	50V	(X515,X525)
C011	1-163-033-91	CERAMIC CHIP	0.022uF	50V	(X515,X525)
C012	1-163-033-91	CERAMIC CHIP	0.022uF	50V	(X515,X525)

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

RP-196 SW-269

Ref. No.	Part No.	Description			Remarks
C013	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C014	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C015	1-124-584-00	ELECT	100uF	20%	10V
C016	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C017	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C018	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C019	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C020	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C021	1-124-584-00	ELECT	100uF	20%	10V
C024	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
C027	1-163-241-11	CERAMIC CHIP	39PF	5%	50V (X515,X525)
C027	1-163-031-11	CERAMIC CHIP	0.01uF		50V (X315,X325,X335,X425)
C029	1-163-241-11	CERAMIC CHIP	39PF	5%	50V
C030	1-163-241-11	CERAMIC CHIP	39PF	5%	50V
C031	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C032	1-163-235-11	CERAMIC CHIP	22PF	5%	50V (X515,X525)

< CONNECTOR >

Ref. No.	Part No.	Description
CN001	1-563-585-11	CONNECTOR, FLEXIBLE 8P
* CN002	1-564-029-00	PIN, CONNECTOR 4P
CN003	1-573-826-11	CONNECTOR, BOARD TO BOARD 12P

< IC >

Ref. No.	Part No.	Description		Remarks
IC001	8-759-352-17	IC	HA118195NT	(X515,X525)
IC001	8-759-357-84	IC	HA118295NT	(X315,X325,X335,X425)

< COIL >

Ref. No.	Part No.	Description	
L003	1-408-982-11	INDUCTOR	100uH
L004	1-408-982-11	INDUCTOR	100uH
L006	1-408-948-00	INDUCTOR	220uH

< TRANSISTOR >

Ref. No.	Part No.	Description	
Q001	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L
Q002	8-729-216-21	TRANSISTOR	2SA1162Y-TE85L

< RESISTOR >

Ref. No.	Part No.	Description			Remarks
R001	1-216-045-00	METAL CHIP	680	5%	1/10W
R002	1-216-045-00	METAL CHIP	680	5%	1/10W (X515,X525)
R003	1-216-055-00	METAL CHIP	1.8K	5%	1/10W (X515,X525)
R003	1-216-051-00	METAL CHIP	1.2K	5%	1/10W (X315,X325,X335,X425)
R004	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R005	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R006	1-216-073-00	METAL CHIP	10K	5%	1/10W
R007	1-216-081-00	METAL CHIP	22K	5%	1/10W
R012	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R013	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R014	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R015	1-216-025-91	METAL GLAZE	100	5%	1/10W (X315,X325,X335,X425)
R017	1-163-241-11	CERAMIC CHIP	39PF	5%	50V (X515,X525)
R017	1-216-025-91	METAL GLAZE	100	5%	1/10W (X315,X325,X335,X425)
R018	1-216-057-00	METAL CHIP	2.2K	5%	1/10W

* A-6794-149-A SW-269 BOARD, COMPLETE
****
(X315,X335,X325,X525)
(Ref.No.1,000 Series)

< CONNECTOR >

Ref. No.	Part No.	Description
CN691	1-506-483-21	PIN, CONNECTOR 4P

< RESISTOR >

Ref. No.	Part No.	Description			Remarks
R691	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R692	1-216-053-00	METAL CHIP	1.5K	5%	1/10W

< SWITCH >

Ref. No.	Part No.	Description
S691	1-571-977-11	SWITCH, TACTIL (FF)
S692	1-571-977-11	SWITCH, TACTIL (PLAY)
S693	1-571-977-11	SWITCH, TACTIL (STOP)
S694	1-571-977-11	SWITCH, TACTIL (REW)

MISCELLANEOUS
****

Ref. No.	Part No.	Description
⚠54	1-468-073-11	POWER BLOCK
⚠54	1-468-095-11	POWER BLOCK (SR705)
158	1-500-144-11	HEAD, FE
165	1-506-485-11	PIN, CONNECTOR 6P
203	1-759-183-11	DRUM ASSY DZH-78A-R (M901) (X315,X325,X335,X425)
203	8-848-682-11	DRUM ASSY DZH-74B/Q-RP (M901)(X515/X525)
251	1-766-723-11	CONNECTOR, BOARD TO BOAR 3P
260	1-762-076-11	SWITCH, ROTARY
D503	8-719-048-26	DIODE GL528V1
M902	1-698-409-11	MOTOR, DC SCV-0801A/Z-NP
M902	1-698-409-14	MOTOR, DC (CAPSTAN)
M903	X-3943-883-1	MOTOR ASSY, CAM
Q503	8-729-025-92	PHOTO TRANSISTOR PT380F
Q504	8-729-025-92	PHOTO TRANSISTOR PT380F

ACCESSORIES & PACKING MATERIALS
****

Ref. No.	Part No.	Description
	1-473-472-31	REMOTE COMMANDER(RMT-V181B)(X515)
	1-473-472-41	REMOTE COMMANDER(RMT-V181C)(X525:AS,NZ)
	1-473-472-51	REMOTE COMMANDER(RMT-V181D)(X525:SA)
	1-473-472-61	REMOTE COMMANDER(RMT-V181E) (X425,X315,X335)
	1-473-472-71	REMOTE COMMANDER(RMT-V181F)(X325:SA)
	1-473-472-81	REMOTE COMMANDER(RMT-V181G)(X325:AS,NZ)
⚠	1-569-008-21	ADAPTER, CONVERSION 2P (X315:ME,SG,X335,X425:ME,X515:ME,SG)
⚠	1-575-131-11	CORD, POWER (X315,X325:SA,X335,X425,X515,X525:SA)
	1-696-593-11	CORD, CONNECTION (PAL)(1.5m)
⚠	1-696-819-11	CORD, POWER (X325:AS,NZ,X525:AS,NZ)
	3-810-182-11	MANUAL, INSTRUCTION(ENGLISH)(X315)
	3-810-182-21	MANUAL, INSTRUCTION(CHINESE)(X315: PS)
	3-810-182-31	MANUAL, INSTRUCTION(ARABIC)(X315:ME,SG)
	3-810-182-41	MANUAL, INSTRUCTION(PERSIAN)(X315: SG)
	3-810-182-71	MANUAL, INSTRUCTION(URDU)(X315:SG)
	3-810-299-11	MANUAL, INSTRUCTION(ENGLISH)(X515)
	3-810-299-21	MANUAL, INSTRUCTION(CHINESE)(X515: PS)
	3-810-299-31	MANUAL, INSTRUCTION(ARABIC)(X515:ME,SG)
	3-810-299-41	MANUAL, INSTRUCTION(PERSIAN)(X515: SG)
	3-810-299-71	MANUAL, INSTRUCTION(URDU)(X515:SG)
	3-810-300-11	MANUAL, INSTRUCTION(ENGLISH)(X425)
	3-810-300-21	MANUAL, INSTRUCTION(CHINESE)(X425: PS)
	3-810-300-31	MANUAL, INSTRUCTION(ARABIC)(X425:ME)
	3-810-302-11	MANUAL, INSTRUCTION(ENGLISH)(X325: AS,NZ)
	3-810-302-21	MANUAL, INSTRUCTION(ENGLISH)(X325: SA)
	3-810-303-11	MANUAL, INSTRUCTION(ENGLISH)(X525: AS,NZ)
	3-810-303-21	MANUAL, INSTRUCTION(ENGLISH)(X525: SA)
	3-810-304-11	MANUAL, INSTRUCTION (ENGLISH,FRENCH,ARABIC)(X335)
*	3-961-581-01	SHEET, PROTECTION
*	3-967-169-01	CUSHION
*	3-967-582-01	INDIVIDUAL CARTON (X315:PS)
*	3-967-582-11	INDIVIDUAL CARTON (X315:ME)
*	3-967-582-21	INDIVIDUAL CARTON (X325:AS)
*	3-967-582-41	INDIVIDUAL CARTON (X315:SG)
*	3-967-582-51	INDIVIDUAL CARTON (X335)
*	3-967-582-61	INDIVIDUAL CARTON (X325:SA)
*	3-967-582-81	INDIVIDUAL CARTON (X525:SA)
*	3-967-582-91	INDIVIDUAL CARTON (X525:AS)

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description	Remarks
*	3-968-029-01	INDIVIDUAL CARTON (X515:PS)	
*	3-968-029-41	INDIVIDUAL CARTON (X515:ME)	
*	3-968-029-51	INDIVIDUAL CARTON (X515:SG)	
*	3-968-029-61	INDIVIDUAL CARTON (X425:PS)	
*	3-968-029-71	INDIVIDUAL CARTON (X425:ME)	
*	3-968-029-81	INDIVIDUAL CARTON (X525:NZ)	
*	3-968-029-91	INDIVIDUAL CARTON (X325:NZ)	

****

HARDWARE LIST

****

Ref. No.	Part No.	Description	Remarks
#1	7-682-547-04	SCREW +P 3X6	
#2	7-685-648-79	SCREW +BVTP 3X12 TYPE2 IT-3	
#3	7-685-646-79	SCREW (3X8)	
#7	7-624-106-04	STOP RING 3.0, TYPE -E	
#8	7-682-645-01	SCREW +PS 3X4	
#9	7-621-772-08	SCREW +B 2X3	

SECTION 6

INTERFACE, IC PIN FUNCTION DESCRIPTION

6-1. SYSTEM CONTROL — MECHANISM BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	EJECTED	CASSETTE LOADING	CASSETTE UNLOADING	TAPE THREADING	TAPE UNTHREADING	STOP	FF	REW	PB	REC
CAM 2	MA-249 Board IC501 ㉛	O	*5	H	L	H	L	*5	*5	*5	*5	*5
CAM 1	MA-249 Board IC501 ㉜	O	*5	*5	*5	*5	*5	*5	*5	*5	*5	*5
MODE 1	MA-249 Board IC501 ㉚	I	—	—	—	—	—	H	H	H	H	H
MODE 2	MA-249 Board IC501 ㉙	I	—	—	—	—	—	L	L	L	H	H
MODE 3	MA-249 Board IC501 ㉘	I	—	—	—	—	—	H	H	H	L	L
MODE 4	MA-249 Board IC501 ㉗	I	—	—	—	—	—	H	L	L	L	L
REC PRF	MA-249 Board IC501 ㊹	I	L	*1	*1	*1	*1	*1	*1	*1	*1	*1
T REEL FG	MA-249 Board IC501 ㉞	I	H/L	H/L	H/L	H/L	H/L	H/L	*2	*2	*2	*2
S REEL FG	MA-249 Board IC501 ㉝	I	H/L	H/L	H/L	*2	*2	H/L	*2	*2	*2	*2
END LED	MA-249 Board IC501 ㊺	O	L	*3	*3	*3	*3	*3	*3	*3	*3	*3
T SENS	MA-249 Board IC501 (90)	I	*3	*3	*3	*4	*4	*4	*4	*4	*4	*4
S SENS	MA-249 Board IC501 (89)	I	*3	*3	*3	*4	*4	*4	*4	*4	*4	*4

*1. "H" when erasing protection tab is bent. "L" when not bent.
*2. Pulse of period in proportion to reel rotating speed.
*3. Approx. 2 msec period "H" pulse.
*4. Normally "L". 2 msec period "H" pulse when tape top or tape end is detected.
*5. Hi-Z

6-2. SYSTEM CONTROL — SERVO PERIPHERAL CIRCUIT INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	STOP	FF	REW	TAPE THREADING	TAPE UNTHREADING	PB	REC
REC CTL	MA-249 Board IC501 ㉑	O	*11	*11	*11	*11	*11	*11	*1
PB CTL	MA-249 Board IC501 ㉕	I	H	*4	*4	—	—	*1	*1
DRUM PG	MA-249 Board IC501 ㉓	I	*5	*5	*5	*5	*5	*5	*5
DRUM FG	MA-249 Board IC501 ㉔	I	*6	*6	*6	*6	*6	*6	*6
CAP FG	MA-249 Board IC501 (97)	I	H/L	*7	*7	*8	*8	*7	*7
CAP RVS	MA-249 Board IC501 ⑰	O	H/L	L	H	L	H	L	L
CAP ERR	MA-249 Board IC501 ④	O	L	*10	*10	*10	*10	*10	*10
DRUM ERR	MA-249 Board IC501 ③	O	*10	*10	*10	*10	*10	*10	*10
SLOW CONT	MA-249 Board IC501 ⑯	O	*12	*12	*12	*12	*12	*12	*12

*1. 25Hz pulse.
*2. 3 value output of "H", "L" and "Hi-Z (2.5V)."
*3. Unstable period Pulse.
*4. Pulse of period in proportion to tape speed.
*5. 25Hz "H" pulse.
*6. 300Hz pulse.
*7. Pulse of period in proportion to tape speed.
*8. Unstable period pulse.
*9. Pulse at tape running.
*10. DC voltage 1 ~ 5V.
*11. Hi-Z (2.5V).
*12. "L" during forward slow, "H" during reverse slow. "Hi-Z" in other modes.

6-3. SYSTEM CONTROL — SYSTEM CONTROL PERIPHERAL CIRCUIT INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	I/O level
$\overline{\text{RESET}}$	MA-249 Board IC501 ㊲	I	Normally "H". "L" when service interruption is detected or restored.
SO 1	MA-249 Board IC501 (77)	O	Serial communication data to video and audio microprocessor.
SCK	MA-249 Board IC501 (79)	I	Serial communication clock with video and audio microprocessor.

6-4. SYSTEM CONTROL AND RF MODULATOR — INPUT SELECTION BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	I/O level
LINE 1	MA-249 Board IC501 ⑭	O	Input select control signal.

6-5. SYSTEM CONTROL — VIDEO BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	STOP/FF /REW	TAPE LOADING	TAPE UNLOADING	PB	REC	REC PAUSE
V-PB	MA-249 Board IC501 (99)	O	H	H	H	L	H	H
RF SWP	MA-249 Board IC501 ⑳	O	*1	*1	*1	*1	*1	*1
Q VD	MA-249 Board IC501 ⑱	O	L	L	L	*2	L	L
$\overline{\text{SP}}$	MA-249 Board IC501 (98)	O	*3	*3	*3	*4	*3	*3
LP	MA-249 Board IC501 ⑮	O	*6	*6	*6	*6	*6	*6
REC. P	MA-249 Board IC501 ②	O	L	L	L	L	L	H
C SYNC	MA-249 Board IC501 (93)	I	*5	*5	*5	*5	*5	*5

*1. Synchronized with drum rotation. 25Hz 50% duty pulse.
*2. Normally "L". "H" when video signal is not generated.
*3. Selected by SP/EP. SP mode: "L", EP mode: "H".
*4. Selected by tape recording mode.

sig/mod	SP	LP	EP
SP (10)	L	H	H
LP (12)	L	H	L

*5. Composite sync signal (positive).
*6. Selected by SP/EP/LP mode. SP mode: "L", EP mode: "H".

6-6. SYSTEM CONTROL — AUDIO BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	STOP/ FF/REW	TAPE LOADING	TAPE UNLOADING	PB	REC	REC PAUSE
NA PB	MA-249 Board IC501 ⑤	O	L	L	L	H	L	L
A MUTE	MA-249 Board IC501 ⑥	O	L	L	L	L	L	L
REC P	MA-249 Board IC501 ②	O	L	L	L	L	L	H
SP	MA-249 Board IC501 (98)	O	*1	*1	*1	*2	*1	*1

*1. Selected by SP/EP selector. SP mode: "L", EP mode: "H".
*2. Selected by tape recording mode. SP mode: "L", EP mode: "H".

6-7. SERVO/SYSTEM CONTROL MICROPROCESSOR M37775M (MA-249 board IC501)

Pin No.	Name	I/O	Function
1	MESECAM	O	MESECAM signal output.
2	RECP	O	"H" when rec. pause mode.
3	DRUM	O	Drum error signal output.
4	CAP ERR	O	Capstan error signal output.
5	NAPB	O	"H" output when pb mode.
6	AMUTE	O	Audio mute signal output.
7	PLL DATA	O	PLL data output.
8	PLL CLK	O	PLL clock output.
9	I2C CLK	O	I2C clock signal output.
10	T-ENABLE	O	Tuner enable signal output.
11	REMOCON	I	SIRCS signal input.
12	$\overline{\text{BG}}$	O	"H" when BG mode.
13	SECAM	I	SECAM system select. Built-in or not.
14	LINE1	O	"H" when input is LINE signal.
15	LP	O	"H" when LP mode.
16	CTL GAIN	O	CTL gain control.
17	CAPRVS	O	Capstan direction control signal. "H" when tape running reverse direction
18	QVD	O	Quasi V signal.
19	DMS MODE 3	I	DMS mode signal input.
20	RFSWP	O	RF switching pulse output
21	REC-CTL	I	REC CTL input.
22	PWR_CONT	O	Power control signal.
23	DRMPG	I	DRUM pg signal input.
24	DRMFG	I	DRUM fg signal input.
25	PBCTL	I	PB CTL signal input.
26	VCC	I	VCC
27	MODE4	I	Mode switch signal input.
28	MODE3	I	Mode switch signal input
29	MODE2	I	Mode switch signal input.
30	MODE1	I	Mode switch signal input.
31	CAM 2	O	CAM motor control signal.
32	CAM 1	O	CAM motor control signal.
33	SREEL	I	Supply reel signal input.
34	TREEL	I	Take up reel signal input.
35	GND	I	GND
36	GND	I	GND
37	RESET_	I	Reset signal input. Active "L"
38	16M	—	For crystal 16MHz.
39	16M	—	For crystal 16MHz.
40	VCC	I	VCC
41	GND	I	GND
42	32K	—	For crystal 32KHz.
43	32K	—	For crystal 32KHz.
44	RECPRF	I	Recording proof signal input.
45	END_LED	O	END sensor signal output.
46	DMS MODE 4	I	DMS mode signal input.
47	SYSTEM 2/ 3.58MHz/LP JOG	O	Each system control signal.
48	APC+NC1	O	APC control signal output.
49	NTSC_	O	NTSC detect signal output.
50	NT-JUDGE	O	NTSC detect signal output.
51	DMS MODE 2	I	DMS mode signal input.
52	G1	O	Fluorescent display control signal.
53	G2	O	Fluorescent display control signal.
54	G3	O	Fluorescent display control signal.
55	G4	O	Fluorescent display control signal.
56	P19	O	Fluorescent display control signal.
57	P18	O	Fluorescent display control signal.
58	P17	O	Fluorescent display control signal.
59	P16	O	Fluorescent display control signal.
60	P15	O	Fluorescent display control signal.
61	P14	O	Fluorescent display control signal.
62	P13	O	Fluorescent display control signal.
63	P12	O	Fluorescent display control signal.
64	P11	O	Fluorescent display control signal.
65	P10	O	Fluorescent display control signal.
66	P9	O	Fluorescent display control signal.
67	P8	O	Fluorescent display control signal.
68	P7	O	Fluorescent display control signal.
69	P6	O	Fluorescent display control signal.
70	P5	O	Fluorescent display control signal.
71	P4	O	Fluorescent display control signal.
72	P3	O	Fluorescent display control signal.
73	P2	O	Fluorescent display control signal.
74	P1	O	Fluorescent display control signal.
75	-9V	I	VCC (-9v input)_
76	VCC	I	VCC
77	SO1	O	Serial data signal output.
78	PAL60	O	Video control signal output.
79	SCK1	O	Serial clock signal output.
80	OSD-CS_	O	OSD chip select signal output.
81	VCC	I	VCC
82	AD	I	VCC for A/D convertor.
83	APC+PWM	O	APC PWM signal output.
84	POWER-FAIL_	I	Power fail detect signal input.
85	TU-AFT	I	Tuner AFT signal input.
86	APC+PWM IN	I	APC PWM signal input.
87	FUNC-KEY2	I	Signal input from function key.
88	FUNC-KEY1	I	Signal input from function key.
89	SSENS	I	Supply sensor signal input.
90	TSENS	I	Take up sensor signal input.
91	AV_CONT	O	AV control signal output.
92	VIDEO-RF	I	Video RF signal input.
93	CSYNC	I	Composite sync signal input.
94	APC+NC2	O	APC control signal output.
95	APC-ON	O	APC control signal output.
96	JOG_	O	"H" When JOG mode.
97	CAPFG	I	Capstan fg signal input.
98	SP_	O	"L" when SP mode.
99	VPB_	O	"L" when video play back mode.
100	RENTAL	O	Video picture control signal output.

SECTION 7
ADJUSTMENTS

7-1. MECHANICAL ADJUSTMENTS

For the mechanical adjustments, please refer to the "VHS MECHANICAL ADJUSTMENT MANUAL IV (H MECHANISM)" (9-973-623-11).

7-2. ELECTRICAL ADJUSTMENTS

See the adjusting part location diagram from on page 7-6 for the adjustment.

2-1. PREPARATION BEFORE ADJUSTMENT

2-1-1. Equipment Required

The measuring instruments used for this alignment include:

1) Monitor TV
2) Oscilloscope, dual-trace, bandwidth of 30MHz or more, with delay mode (A probe 10:1 should be used unless otherwise specified.)
3) Frequency counter
4) Pattern generator
5) Digital voltmeter
6) Audio generator
7) Audio level meter
8) Audio distortion meter
9) Audio attenuator
10) Alignment tape
    MH-2 Part No. : H7099052H

2-1-2. Equipment Connection

Unless otherwise specified, connect and adjust the measuring instruments as shown in the following diagram.

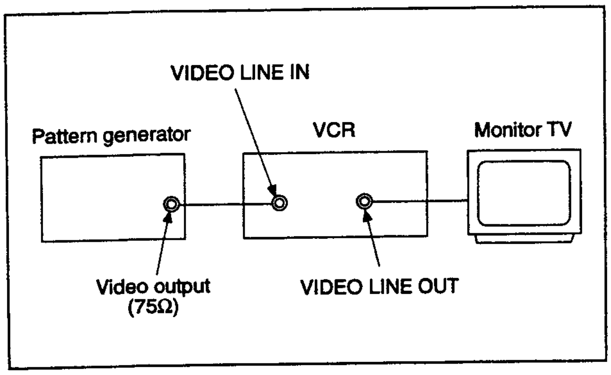


Fig. 7-2-1.

2-1-3. Input Signal Check

Video signal produced by a pattern generator is used as an adjustment signal to perform electrical alignment for this unit. This video signal must satisfy the specification.

Unless otherwise specified, place the switches and controls of this unit in the following positions:

- CHANNEL switch ································LINE

Connect an oscilloscope to the Video Input terminal. Check that the synchronizing signal of the Y signal has an amplitude of approximately 0.7V and that the burst signal has an amplitude of approximately 0.3V and its waveform is flat. And check that the level ratio of burst signal to "red" signal is 0.30 : 0.66. The video signal (color bar) used for electrical aligning this unit is shown in Fig. 7-2-2.

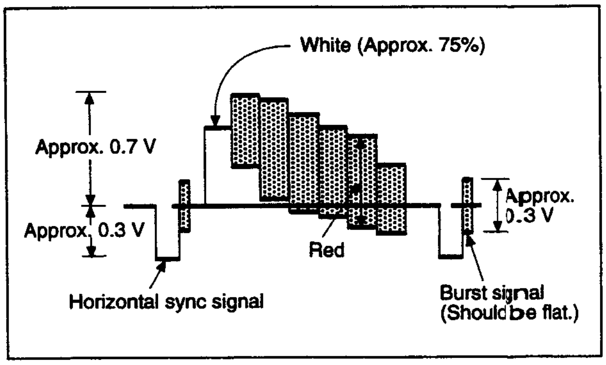


Fig. 7-2-2. Color Bar Signals of Pattern Generator

2-1-4. Alignment Tape

- Contents of MH-2 (H7099052H)

	Mode	Period	Video signal	Audio signal
1	SP	10 minutes	Stair step	7kHz
2		5 minutes	—	3kHz
3		10 minutes	Color bar	1kHz
4		3 minutes	RF sweep	—

2-1-5. Input/Output Levels and Impedance

Video input: LINE IN
(phono jack) (1)
Input signal: 1Vp-p, 75ohms, unbalanced, sync negative

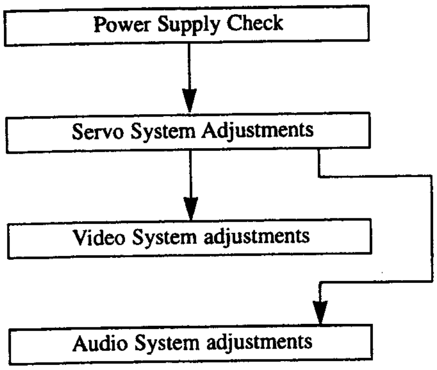
Video output: LINE OUT
(phono jack) (1)
Output signal: 1Vp-p, 75ohms, unbalanced, sync negative

Audio input: LINE IN
(phono jack) (1)
Input level: -7.5 dBs
(0dBs=0.775Vrms)
Input impedance: more than 47 kilohms

Audio output: LINE OUT
(phono jack) (1)
Standard level: -7.5dBs at load impedance 47 kilohms
Output impedance: less than 10 kilohms

2-1-6. Adjustment Sequence

The adjustments should be performed in the following sequence.



2-2. POWER SUPPLY CHECK

2-2-1. Output Voltage Check (MA-249 Board)

Mode	E-E
Measuring Instrument	Digital voltmeter
SW 12V Check	
Measurement point	IC141 pin ②
Specified value	12.0 ± 0.3V
MTR12V Check	
Measurement point	D131 cathode
Specified value	12.4 ± 0.5V
SW5V Check	
Measurement point	Q161 emitter
Specified value	5.1 ± 0.2Vdc
D5V Check	
Measurement point	D505 cathode
Specified value	5.1 ± 0.2V

[Check Method]

1) Each of these supply voltages must meet its specified value.

2-3. SERVO SYSTEM CHECK

Unless otherwise specified, set the switches to the following positions.

- CHANNEL Switch ....LINE
- TAPE SPEED Switch ....SP

2-3-1. RF Switching Position Check (MA-249, RP-196 Boards)

[Adjustment Purpose]

To check the link of the A-ch and B-ch of the tape playback outputs.

To make the unit compatible with other tapes and units. If this specification is not satisfied, the link will appear on the screen and the screen will be disrupted, etc.

Mode	Playback
Signal	Alignment tape: SP color bar portion
Measurement point	CH1: Video LINE OUT terminal CH2: CN002 pin ③ (RF SWP) (RP-196 board)
Measuring instrument	Oscilloscope
Specified value	6.5 ± 0.5H (416 ± 32 μSEC)

[Check Method]

1) Set TRACKING switch to MANUAL. ("Auto tracking" display will disappear on the display window indicator.)
2) Press the tracking buttons ▼ and ▲ and adjust the tracking position to the center.
3) Confirm the specified value 416 ± 32μSEC (6.5±0.5H)

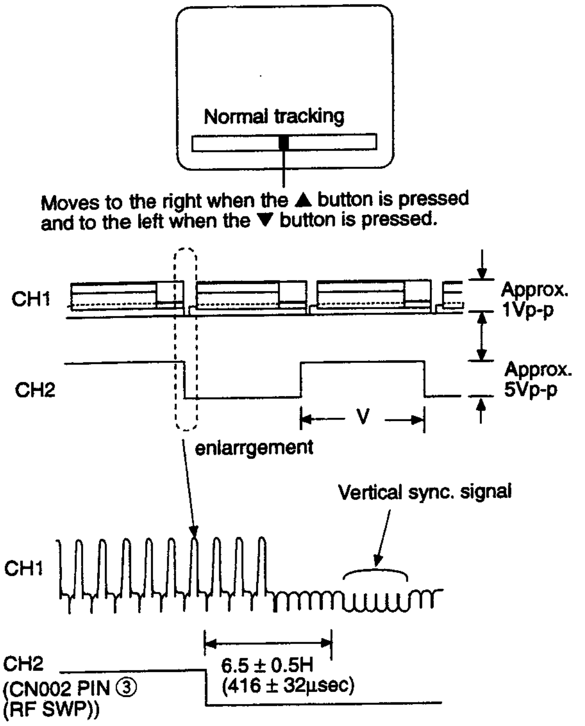

Normal tracking
Moves to the right when the ▲ button is pressed and to the left when the ▼ button is pressed.
CH1
Approx. 1Vp-p
CH2
Approx. 5Vp-p
V
enlarrgement
Vertical sync. signal
CH1
CH2
(CN002 PIN ③
(RF SWP))
6.5 ± 0.5H
(416 ± 32μsec)

Fig. 7-2-3.

2-4. VIDEO SYSTEM CHECKS

For the video system checks, follow the checking procedures given below as a rule. The color bar video signal supplied from the pattern generator is used as the video input signal for the video system adjustment of the recording mode. Check that the signal satisfies the specified value designated in the "Check of input signal" (Fig. 7-2-2)

Unless otherwise specified, set the switches to the following positions.

- CHANNEL Switch ....LINE
- TAPE SPEED Switch ....SP

[Checking Sequence]

1) X'tal OSC Check
2) SYNC AGC Check
3) White clip/Dark clip Check
4) Recording Y Level Check
5) Recording Chroma Level Check
6) Playback Level Check

2-4-1. X'tal OSC Check (MA-249 Board)

Mode	Playback
Signal	Alignment tape: SP Color bar portion
Measurement point	IC201 pin ㉓
Measuring instrument	Oscilloscope and Frequency counter
Specified value	4,433,619 ± 90Hz

Note: A frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Check Method]

1) Check that the oscillation frequency satisfies the specified value and that the oscillation voltage is 450 ± 200mVp-p.

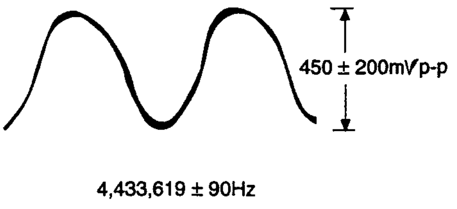

450 ± 200mVp-p
4,433,619 ± 90Hz

Fig. 7-2-4.

2-4-2. SYNC AGC Check (MA-249 Board)

Mode	E-E
Signal	Color bar
Measurement point	Video LINE OUT terminal
Measuring instrument	Oscilloscope
Specified value	A=1.00 ± 0.05Vp-p

[Check Method]

1) Check that the SYNC AGC level (A) satisfies the specified value.

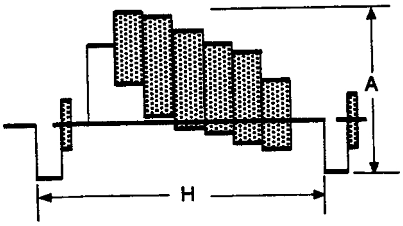


Fig. 7-2-5.

2-4-3. White Clip/Dark Clip Check (MA-249 Board)

Mode	E-E
Signal	Color bar
Measurement point	IC201 pin ㉜
Measuring instrument	Oscilloscope
Specified value	White clip: 190 ± 15% Dark clip: 52 ± 10%

[Check Method]

1) Check that the white clip level is 190 ± 15% to the white (100%) level.
2) Check that the dark chip level is 55 ± 10% to the white (100%) level.

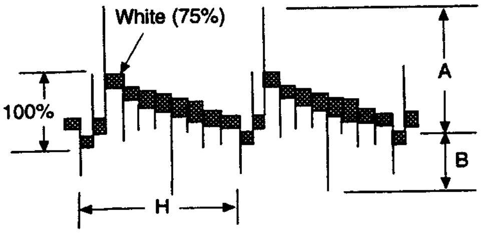


Fig. 7-2-6.

2-4-4. Recording Y Level Check (MA-249 Board)

Mode	E-E
Signal	No-signal
Measurement point	Q214 Emitter
Measuring instrument	Oscilloscope
Specified value	A=550 ± 150mVp-p

[Check Method]

1) Check that the recording RF signal satisfies the specified value.

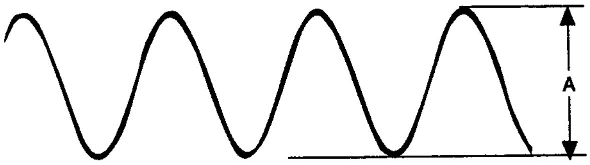


Fig. 7-2-7.

2-4-5. Recording Chroma Level Check (MA-249 Board)

Mode	Recording
Signal	Color bar
Measurement point	IC201 pin ㉚
Measuring instrument	Oscilloscope
Specified value	A=160±28mV

[Check Method]

1) Confirm the amplitude of recording chroma level becomes the specified value.

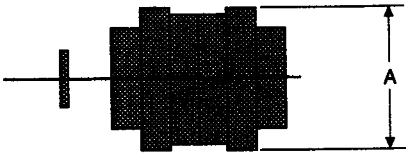


Fig. 7-2-8.

2-4-6. Playback Level Check (MA-249 Board)

Mode	Playback
Signal	Alignment tape: SP mode color bar portion
Measurement point	Video LINE OUT terminal
Measuring instrument	Oscilloscope
Specified value	A=1.00±0.02Vp-p

[Check Method]

1) Check that the playback level satisfies the specified value.

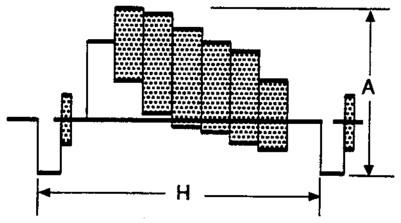


Fig. 7-2-9.

2-5. AUDIO SYSTEM ADJUSTMENT

[Connecting Instruments]

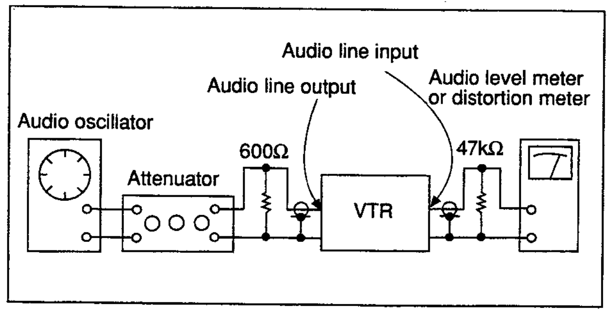

Audio line input
Audio line output
Audio level meter or distortion meter
Audio oscillator
600Ω
47kΩ
Attenuator
VTR

Fig. 7-2-10.

- Adjust in the SP mode if there is no special indications.
- Perform the adjustment setting the switch on the following positions.

CHANNEL Switch ....LINE

[Adjustment Method]

1. ACE head adjustment.....Refer to the VHS mechanical adjustment manual Ⅳ.
2. E-E output level check
3. Overall Output level and distortion factor check
4. Overall noise level check.

2-5-1. ACE Head Adjustment

Refer to the “VHS mechanical adjustment manual Ⅳ” (9-973-623-11).

2-5-2. E-E Output Level Check

Mode	E-E
Signal	400Hz, -7.5dBs: Audio LINE IN
Measurement point	Audio LINE OUT terminal
Measuring instrument	Audio level meter
Specified value	-7.5 ± 3dBs

[Check Method]

1) Input signal of 400Hz and -7.5dBs to the audio input.
2) Check that the audio output level is -7.5 ± 3dBs.

2-5-3. Overall Output Level and Distortion Factor Check

Mode	Self-record playback
Signal	400Hz, -7.5dBs: Audio LINE IN
Measurement point	Audio LINE OUT terminal
Measuring instrument	Audio level meter and Distortion meter
Specified value	Playback Level: -7.5 ± 3dBs Distortion: 4.0% or less

[Check Method]

1) Input signal of 400Hz and -7.5dBs to the audio input.
2) Record signal.
3) Playback the recorded portion.
4) Check that the output level is -7.5 ± 3dBs.
5) Check that the distortion factor is 4.0% or less .

2-5-4.Overall Noise Level Check

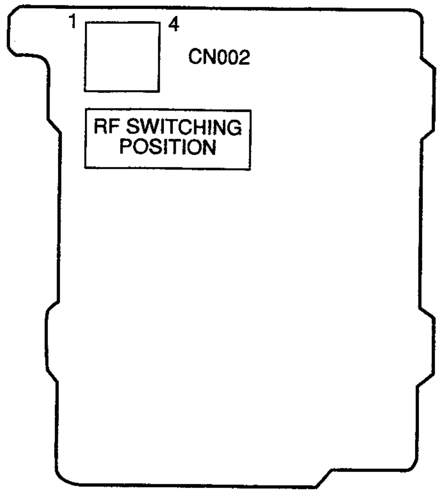
Mode	Self-record playback
Signal	No signal (Insert a shorting plug into the Audio LINE IN terminal)
Measurement point	Audio LINE OUT terminal
Measuring instrument	Audio level meter (IHF-A weighing filter is used)
Specified value	-46dBs or less

[Check Method]

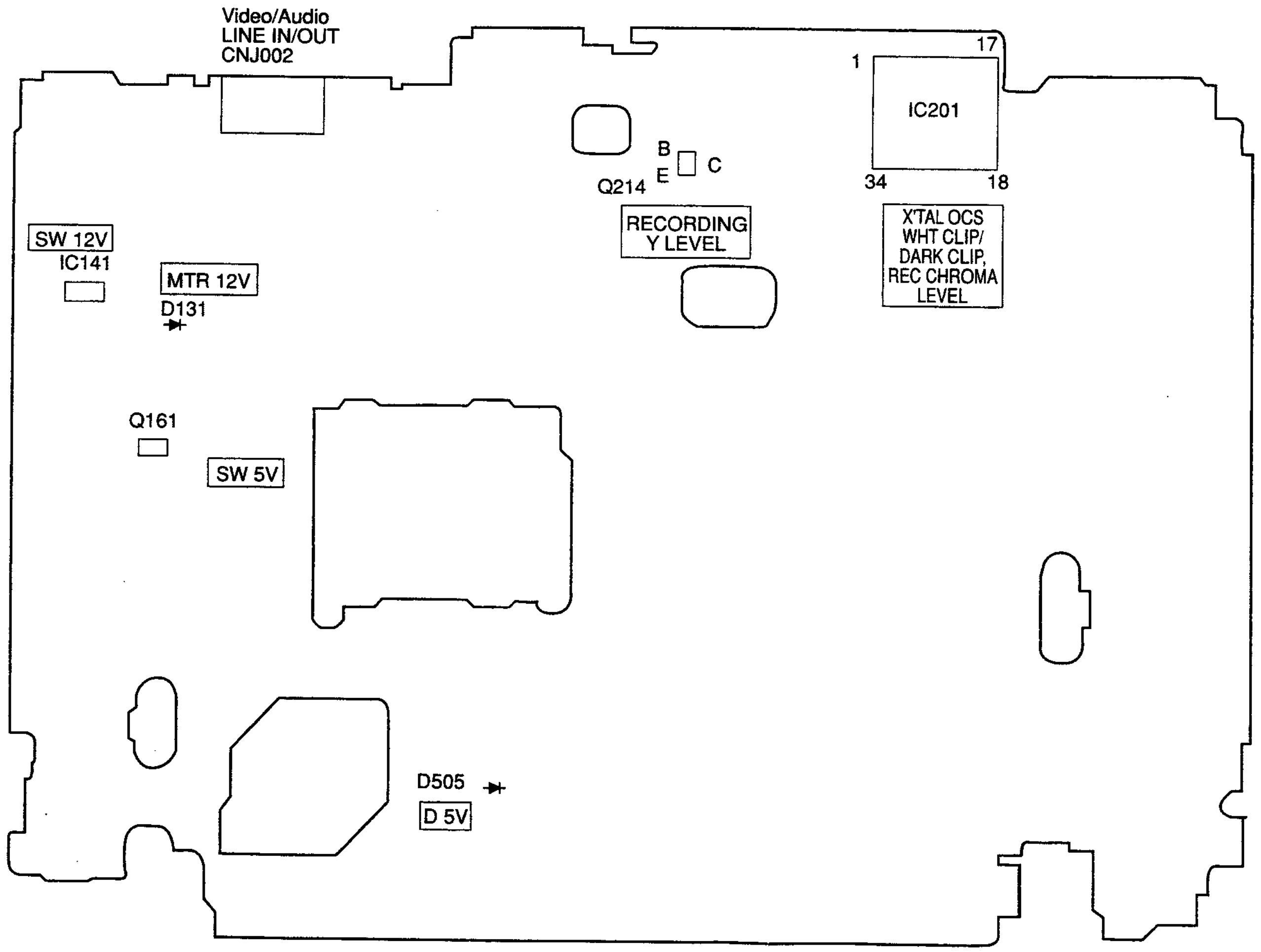
1) Record.
2) Playback recorded portion.
3) Check that noise level is -46dBs or less.

2-6. ADJUSTMENT PARTS LOCATION DIAGRAM

RP-196 BOARD (Conductor Side)


1
4
CN002
RF SWITCHING POSITION

MA-249 BOARD (Conductor Side)


Video/Audio LINE IN/OUT CNJ002
1
17
IC201
34
18
B
C
E
Q214
RECORDING Y LEVEL
X'TAL OCS WHT CLIP/ DARK CLIP, REC CHROMA LEVEL
SW 12V
IC141
MTR 12V
D131
Q161
SW 5V
D505
D 5V

V19617

SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

RMT-V181B/V181C/V181D/V181E/V181F/V181G

SONY

SERVICE MANUAL

ME Model
SLV-X315ME/X425ME/X515ME
PS Model
SLV-X315PS/X425PS/X515PS
SG Model
SLV-X315SG/X515SG
Australian Model
SLV-X325AS/X525AS
New Zealand Model
SLV-X325NZ/X525NZ
South African Model
SLV-X325SA/X525SA
African Model
SLV-X335AF

CORRECTION-1

Correct your service manual as shown below.

RF Switching Position Adjustment correct

(96-015)

As the adjustment method of the RF switching position was mistaked, please correct it.

Please refer to the next page for the correct adjustment method.

SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

Page 7-3

2-3. SERVO SYSTEM. ADJUSTMENT

2-3-1. RF Switching Position Adjustment (MA, RP Boards)

[Adjustment Purpose]

To adjust the link of the A-ch and B-ch of the tape playback outputs.

To make the unit compatible with other tapes and units. If this specification is not satisfied, the link will appear on the screen and the screen will be disrupted, etc.

Mode	Playback
Signal	Alignment tape: SP color bar portion
Measurement point (Fig.A)	CH1: Video LINE OUT terminal CH2: CN002 pin ③ (RF SWP) (RP board)
Measuring instrument	Oscilloscope
Specified value	6.5 ± 0.5H (416 ± 32 µsec)

[Adjustment Method]

1) Short-circuit the ADJ-MODE land on MA board for about 1 second to activate the RF switching position adjustment mode. (Fig. C)
2) Check that "ADJUST" is indicated on FL display.
3) Using the channel + and – buttons, adjust to 416±32µsec (6.5±0.5H).
4) Press the PAUSE button.
5) Press the EJECT button.

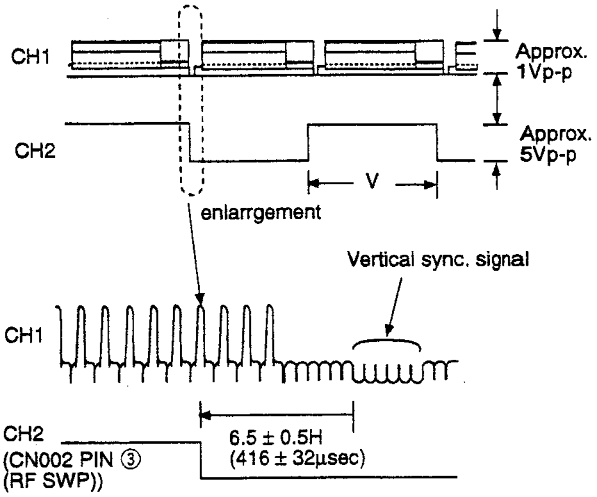


Fig. 7-2-3

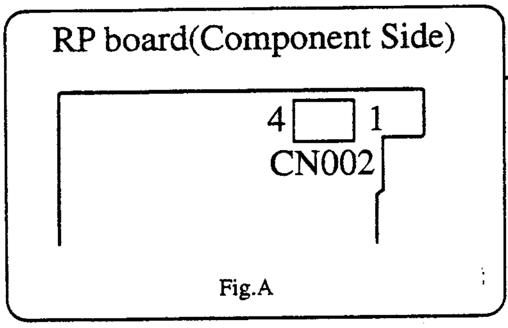


Fig.A

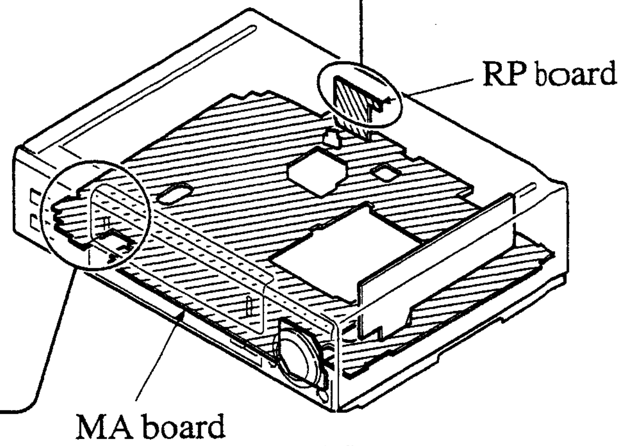


Fig.B

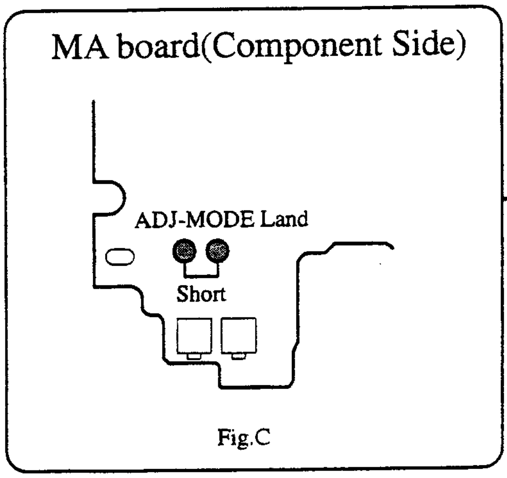


Fig.C

English
96D1616-1
Printed in Japan
© 1996.4
Published by Quality Engineering Dept.
(Osaki East)

Sony Corporation
Home A&V Products Company

English
96A1614-1
Printed in Japan

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Published by Personal A&V Products Div.
Quality Engineering Dept.

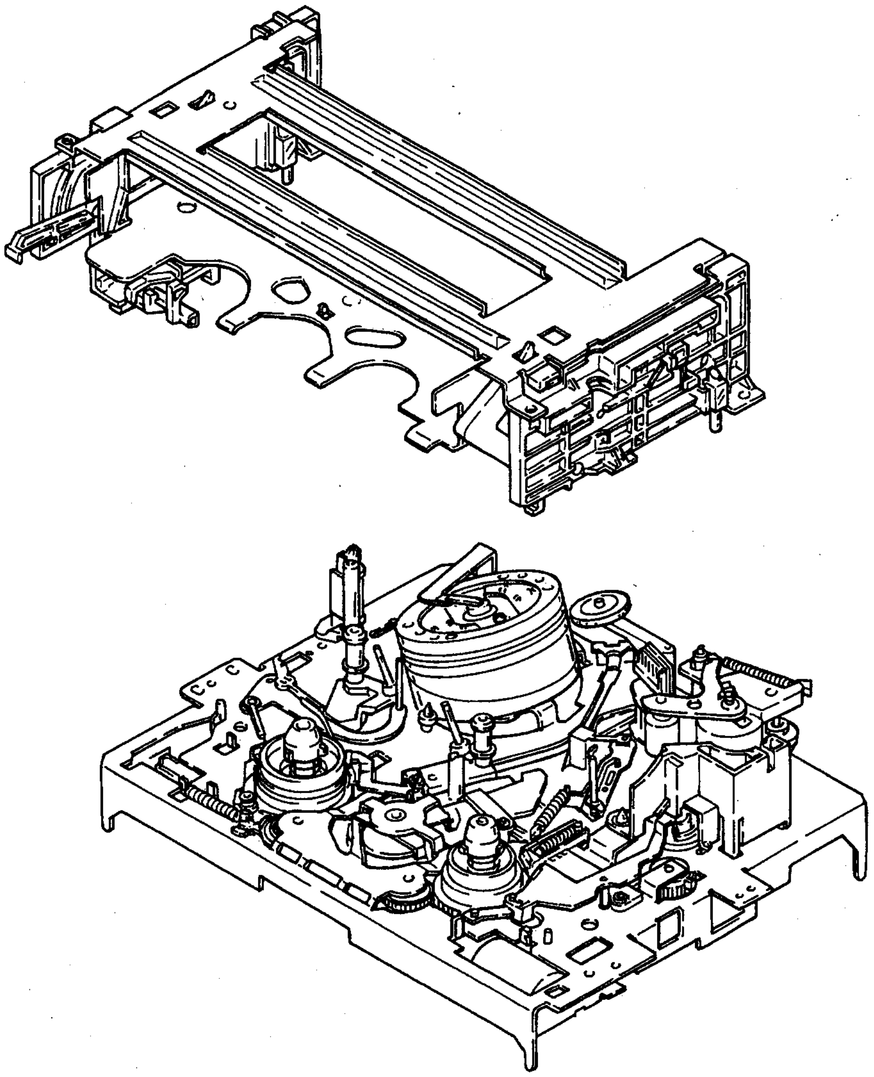
Sony Corporation
Consumer A&V Products Company
Home A&V Products Div.

VHS MECHANICAL ADJUSTMENT MANUAL IV

V03056

H MECHANISM

Please use with the service manual.



VHS VIDEO CASSETTE RECORDER

SONY®

MICROFILM

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1. PREPARATION FOR MECHANISM CHECK ADJUSTMENT AND REPLACEMENT

Refer to the service manual, "DISASSEMBLY" for removal of the cabinet and boards.

1-1. LOADING AND THREADING PROCEDURE WHEN THE POWER TURNS OFF (Fig. 1-1)

1-1-1. LOADING AND THREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓐ direction until loading and threading are end.

1-1-2. LOADING AND THREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Applying approx. +9 V (300 mA) to cam motor with regulated DC power supply makes it loading and threading.

Note: When loading and threading without cassette, claws are caught in four positions as following figure (in the order ① → ② → ③ → ④).
So release them with hands.

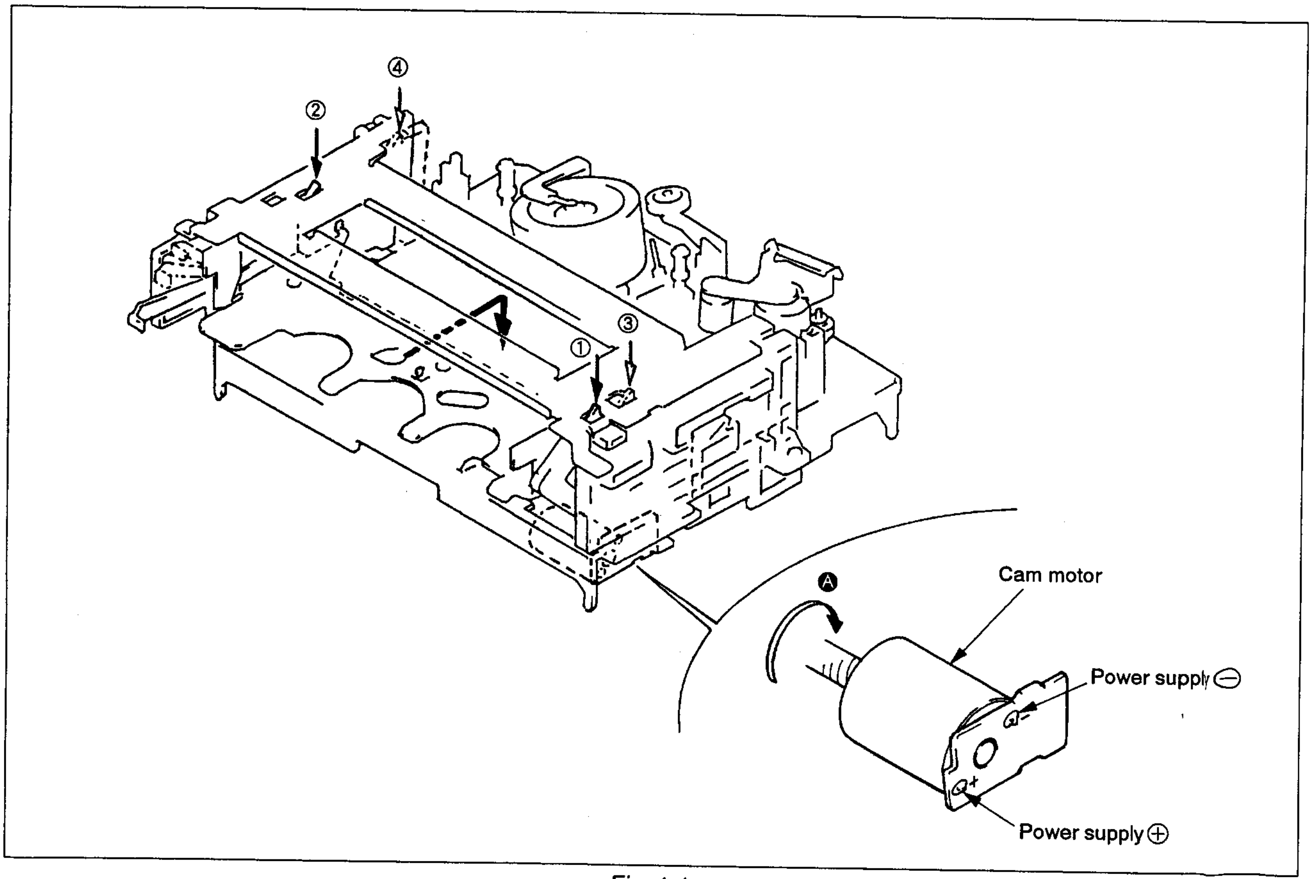


Fig. 1-1

1-2. UNLOADING AND UNTHREADING PROCEDURE WHEN THE POWER TURNS OFF (Figs. 1-2 and 1-3)

1-2-1. UNLOADING AND UNTHREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓑ direction until unthreading is end.
2) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.
3) Turn cam motor in the arrow Ⓑ direction until unloading is end.

1-2-2. UNLOADING AND UNTHREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Apply approx. +9 V (300 mA) to contrary polarities of cam motor.
2) Unthreading operation begins, tape guides return to their original positions (Unthreading operation is end but tape remains), then stop cam motor by turning power off.

Note: When unloading begins and cassette lid is closed, turn cam motor in the arrow Ⓐ direction to open tape guard.

3) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.

Note: That tape is not caught at pinch roller. (Fig. 1-3)

4) Check that tape is not loosened completely, and apply approx. +9 V (300 mA) to contrary polarities of cam motor with regulated DC power supply. (Fig. 1-2)

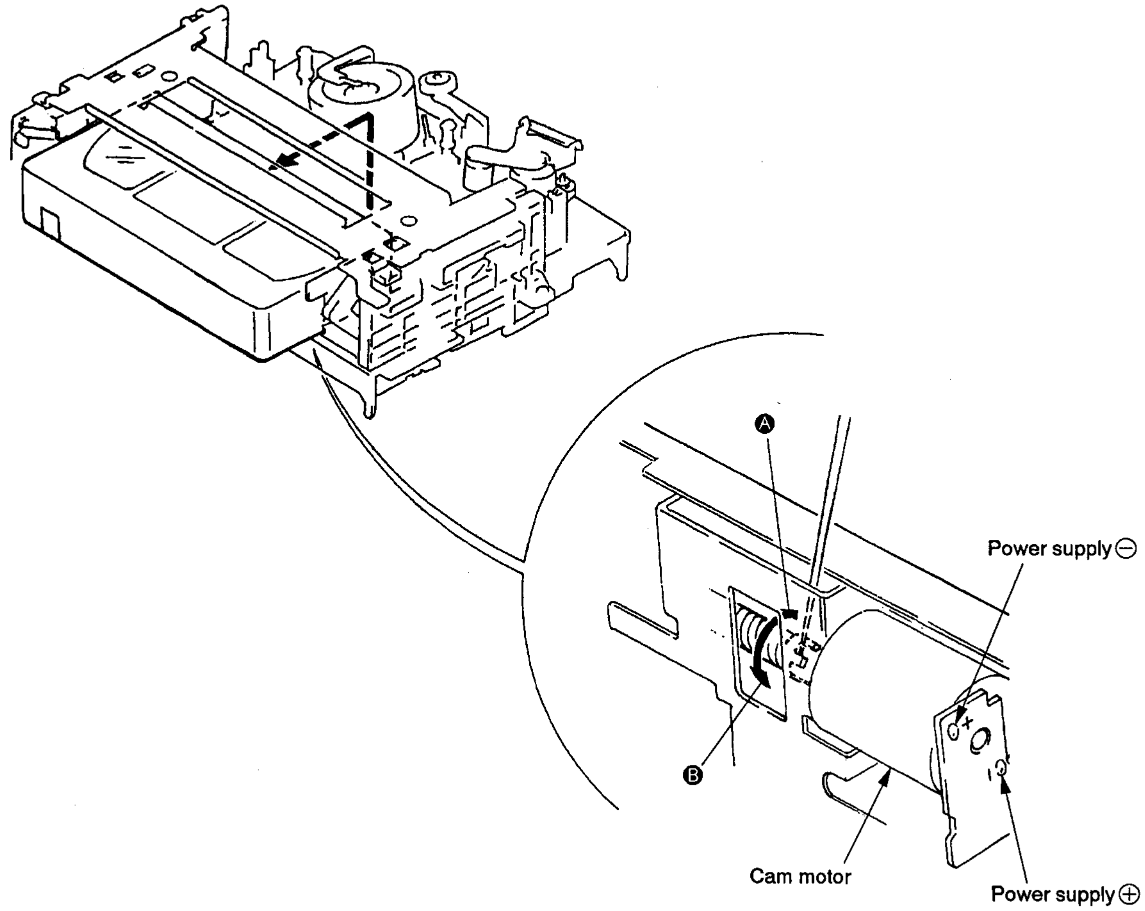


Fig. 1-2

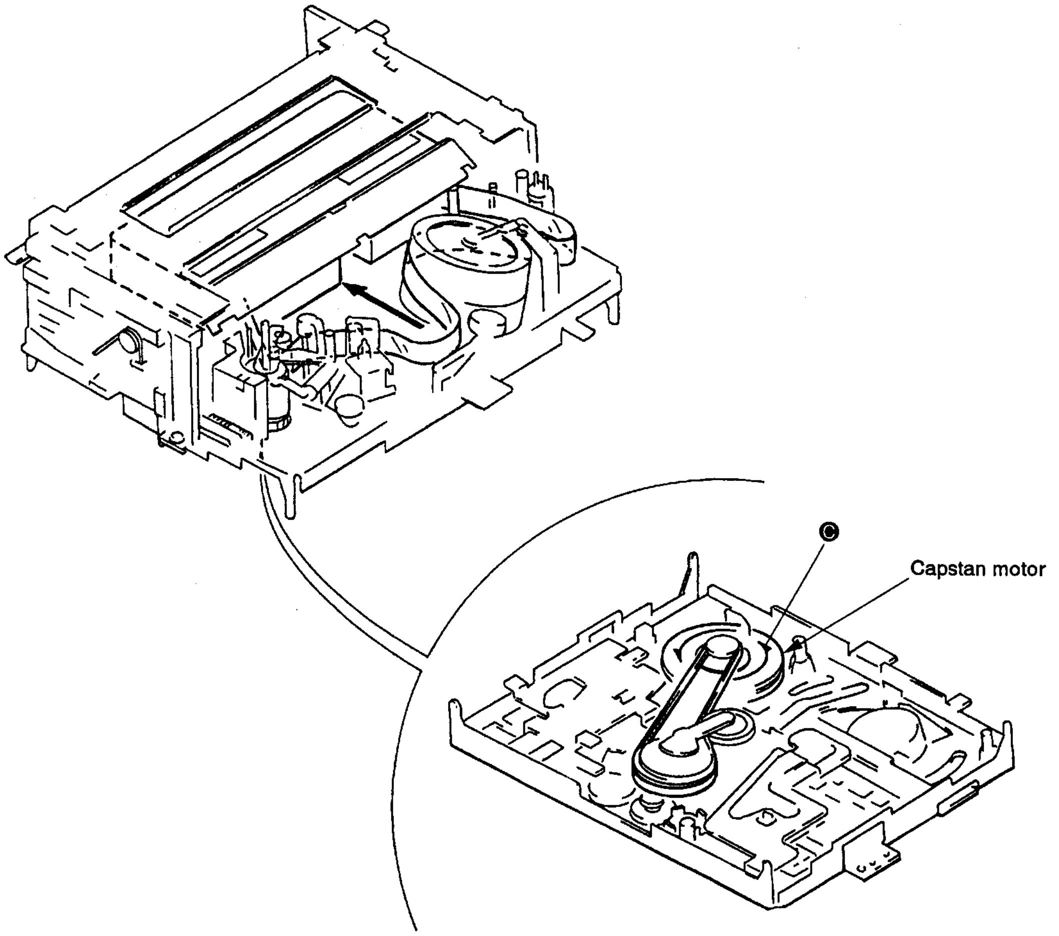

Ⓒ
Capstan motor

Fig. 1-3

1-3. HOW TO COMPLETE THREADING WITHOUT CASSETTE COMPARTMENT (Fig. 1-4)

Note 1: Put the FL block assembly removed the FL top plate on the bottom not to put dust or grease the top sensor and the end sensor luminous plates or not to scratch them. (Fig. A)

1) Pull out AC plug from wall outlet.
2) Shade near the end and top sensors with a black masking tape on the like.
3) Press cassette in/rec proof switch with a tip of screwdriver or the like.
4) Connect AC plug to wall outlet.
5) Release cassette in/rec proof switch by putting off a tip of screwdriver or the like.
   (At this time, power turns on, rewind operates for 10 seconds, after that power turns off.)

Note 2: In this condition, each mode can be set to video cassette recorder. (including recording mode)
However, fast forward should be done after rewinding for 15 seconds or more.

Note 3: After above mentioned operation, be sure to return the mode in the following order.

1) Remove the tape near the end and top sensors.
2) Pull out AC plug from wall outlet to reset the system control microcomputer.

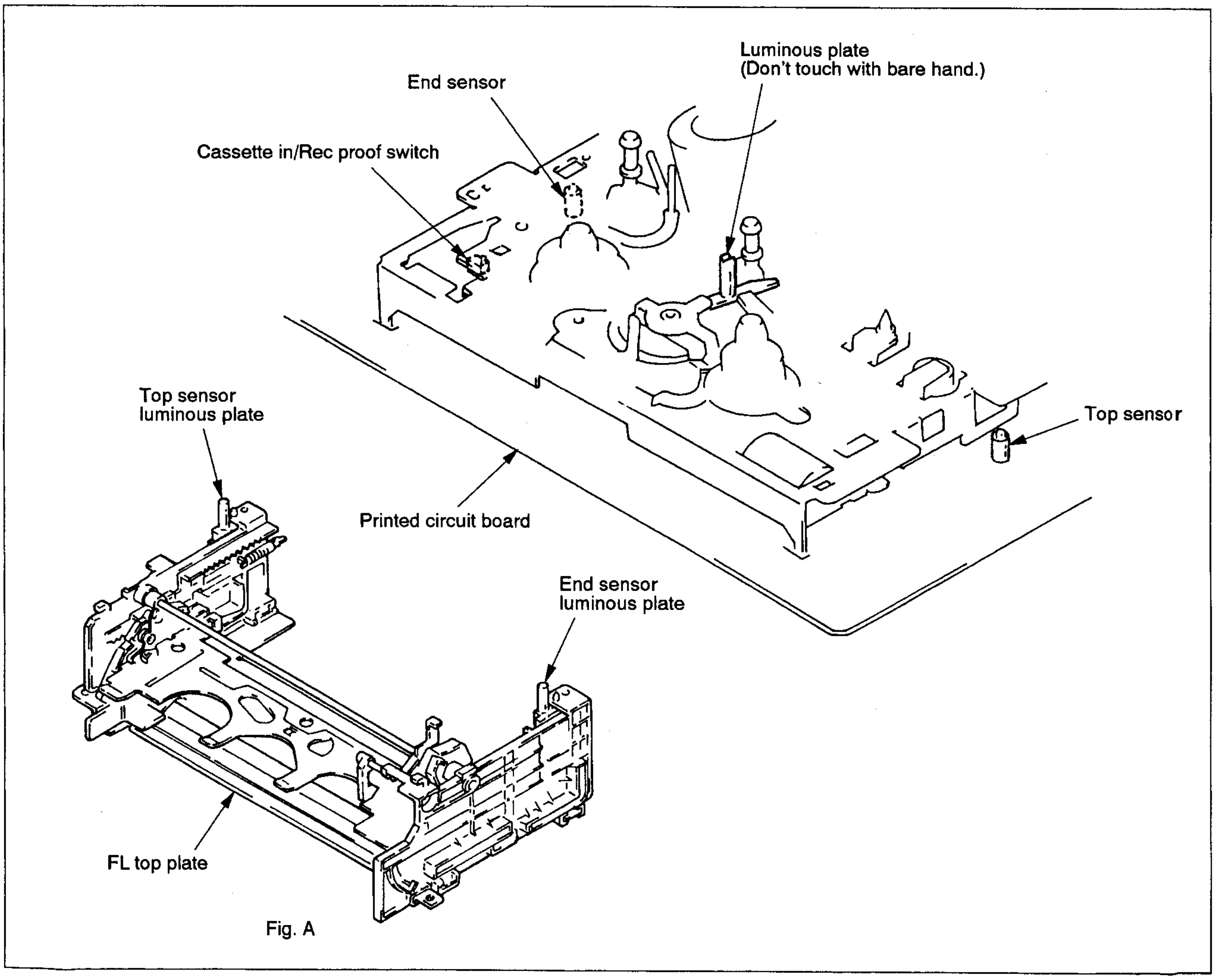

Luminous plate
(Don't touch with bare hand.)
End sensor
Cassette in/Rec proof switch
Top sensor
luminous plate
Top sensor
Printed circuit board
End sensor
luminous plate
FL top plate
Fig. A

Fig. 1-4

2. PERIODIC CHECK AND REPLACEMENT

In order to obtain the best performance from this unit and make full use of its capabilities, and to extend the life of the unit and tapes, it is recommended that the following periodic checks and maintenance be performed.

* The following must be done after every repair regardless of how many hours the user has operated the machine.

2-1. CLEANING OF ROTATING HEAD DISK ASSEMBLY

1) Press a chamois cloth (Jig Ref. No. J-9) which has been dipped in cleaning fluid (Jig Ref. No. J-8) lightly against the rotating drum assembly, then do the cleaning by slowly rotating the rotating head disk by hand. (Never try to clean by using the motor to turn it.)
2) Never try to clean by moving the chamois cloth at a vertical angle to the head tip. There is a very great danger of damaging the head tip if this is done.

2-2. CLEANING OF THE TAPE MOVEMENT SYSTEM

1) Clean the surfaces which the tape contacts during its movement (tape guide, drum assembly surface, capstan, pinch roller, etc.) with a chamois cloth that has been dipped in cleaning fluid.

2-3. CLEANING THE DRIVE SYSTEM

1) Clean the driving parts with a cloth that been dipped in cleaning fluid.

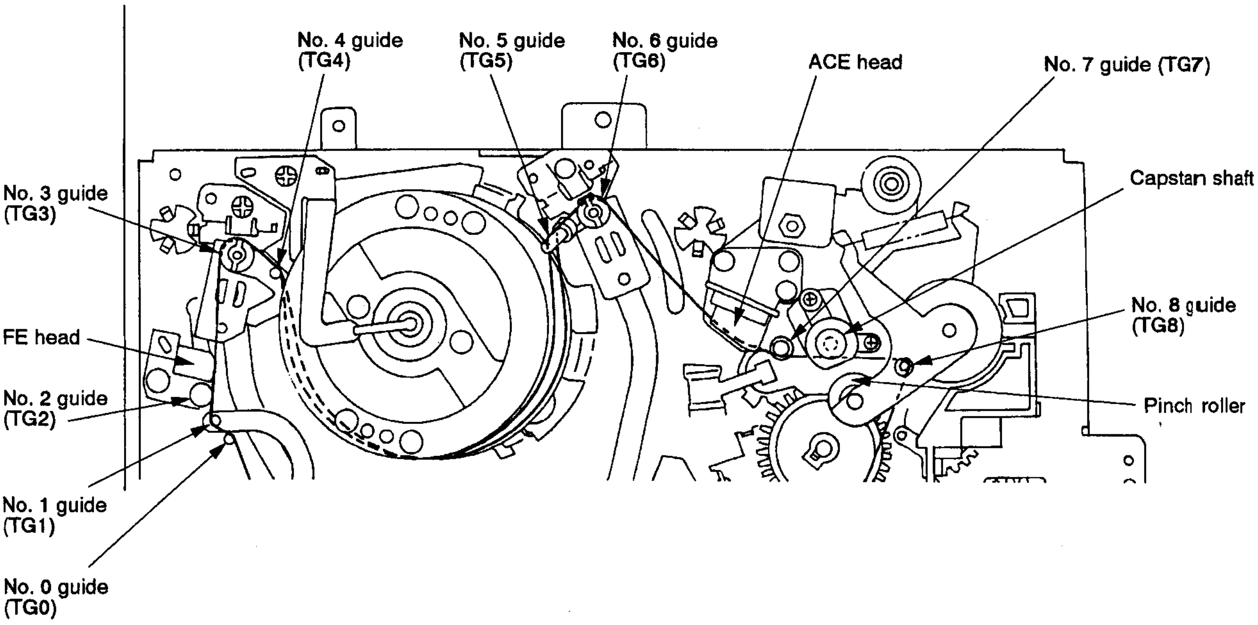

No. 4 guide (TG4)
No. 5 guide (TG5)
No. 6 guide (TG6)
ACE head
No. 7 guide (TG7)
No. 3 guide (TG3)
Capstan shaft
FE head
No. 8 guide (TG8)
No. 2 guide (TG2)
Pinch roller
No. 1 guide (TG1)
No. 0 guide (TG0)

Fig. 2-1 Parts requiring cleaning

2-4. PERIODIC CHECK ITEMS

Perform the maintenance and check listed on the table below, according to users operating hours.

Maintenance & Check	Operating Hours (H)	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape Transportation System	Cleaning of tape transportation system	○	○	○	○	○	○	○	○	○	○	This cleaning must be done whenever a repair is made.
	Cleaning and degaussing of ACE assembly	○	○	○	○	○	○	○	○	○	○	
	Cleaning & degaussing of upper drum assembly	○	○	○	○	○	○	○	○	○	○	The life of the head varies, depending on operational conditions and method.
Performance Confirmation	Abnormal sound	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which causes abnormal sound.
	Measurement of FWD back tension	–	☆	–	☆	–	☆	–	☆	–	☆	Confirmation must be made according to 4-1-1. Specified value: adjust to 36 to 44 g•cm (when measured with torque cassette tape)
	Confirmation of brake system	–	☆	–	☆	–	☆	–	☆	–	☆	Confirmation must be made according to section.
	Confirmation of record & playback functions	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.
	Measurement of forward torque	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust to 70 to 120 g•cm

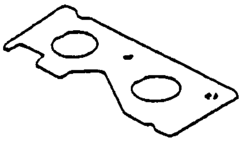
○ Cleaning ☆ Confirmation

Note: On overhaul
When overhauling the unit, replace parts as indicated in the above table.

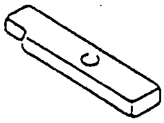
2-5. TOOLS AND FIXTURES REQUIRED FOR SERVICING

Ref No.	Name	Part No.	Carved Jig No.	Remarks
J-1	Master Plane	H-7099-279-H		Applicable to S-VHS
J-2	Reel Disk Height Jig	H-7099-038-H		
J-3	Torque Gauge Adaptor	H-7099-035-H		
J-4	0.93 mm Torque Gauge	H-7099-039-H		
J-5	Hex. Wrench	H-7099-202-H		
J-6	Torque Measurement Cassette VHT-063S	J-6082-011-A		For FWD & back tension torque measurement.
	Torque Measurement Cassette VHT-404S	J-6082-012-A		For CUE and review torque measurement.
J-7	Alignment Tape JVC-MH-1 (NTSC) 24HASF-2 (NTSC Hi-Fi) JVC-MH-2 (PAL) JVC-MH-4 (SECAM)	H-7099-046-H H-7099-153-H H-7099-052-H H-7099-053-H		
J-8	Cleaning Fluid	Y-2031-001-0	———	
J-9	Chamois Leather	2-034-697-00	———	
J-10	Head Demagnetizer	Widely available	———	Demagnetize video heads and audio heads.
J-11	Dental Mirror (With handle) Dental Mirror (Mirror)	J-6080-029-A J-6080-030-1	SL-5052	Tape path and tape traveling adjustments or checks.
J-12	FLOIL SG-055G	7-651-000-09		
J-13	Diamond Oil NT-68	7-661-018-18		
J-14	Screw Lock G (1401B)	7-432-114-11		

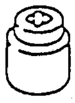
J-1



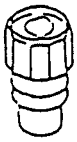
J-2



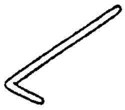
J-3



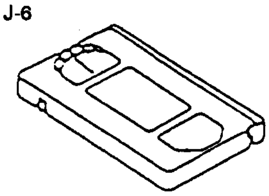
J-4



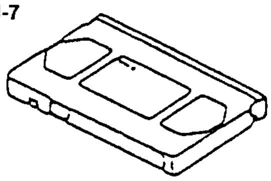
J-5



J-6

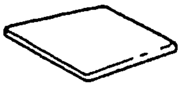


J-7

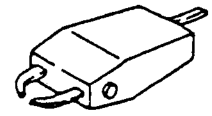


J-8

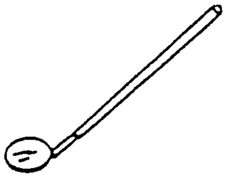
J-9



J-10



J-11



J-12

7-651-000-09
SG-055G

J-13

J-14

3. MAINLY MECHANICAL PARTS REPLACEMENT

Notes:

- Refer to the service manual, "DISASSEMBLY" for removal of the cabinet and boards.
- On mounting, while referring to notes on mounting perform reversely in the removal order.
- When replacing greased parts, grease them in the same way.
- Do not oil, grease or touch with bare hands the surfaces contacts tape of guides and brake shoes.
- Install gears to engage each other.
- Basically, disassembling and assembling should be done in the unthreading-end condition.

3-1. FL BLOCK ASSEMBLY (Fig. 3-1)

1) Remove screws ①.
2) Remove FL block assembly ② in the arrow 🅐 direction.

Note: Be careful not to damage claws on the bottom and front.

[Note on Mounting]

- First insert claws on the bottom and front not to damage.
- Engage FL slide plate to FL driving gear with slightly sliding FL slide plate. (Fig. A)
- Keep clean top sensor and end sensor luminous plates. (Refer to 1-3.)

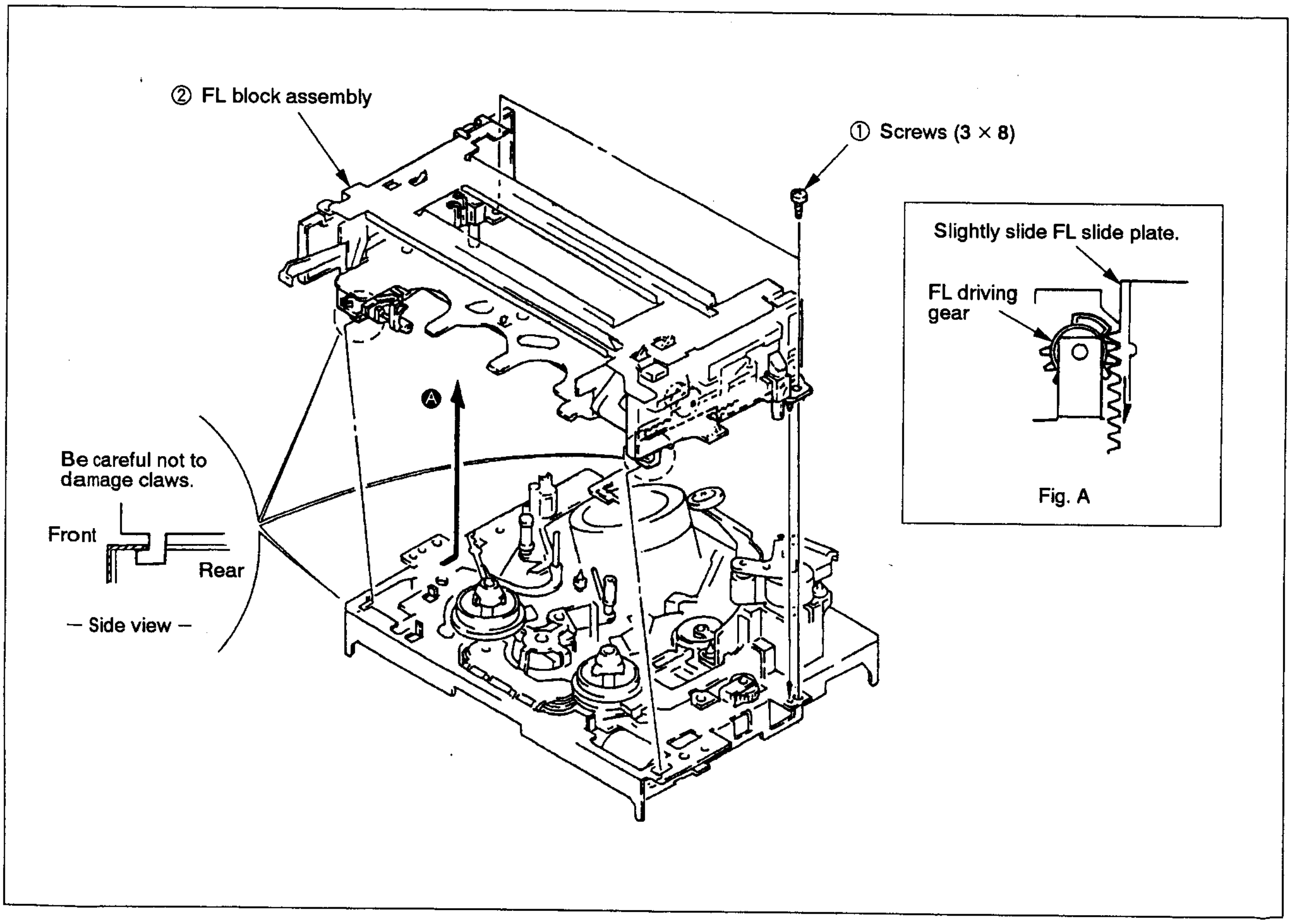

② FL block assembly
① Screws (3 × 8)
🅐
Be careful not to damage claws.
Front
Rear
— Side view —
Slightly slide FL slide plate.
FL driving gear
Fig. A

Fig. 3-1

3-2. DRUM ASSEMBLY (Fig. 3-2)

1) Remove screw ①.
2) Remove ground shaft assembly ② not to touch its tip with bare hand or tools.
3) Remove screws ③ to remove drum assembly ④.

[Note on Mounting]

- Don't touch head chips ⑤ and ground shaft assembly ④ with bare hand or tools.
- Keep clean the surface contacts tape of drum assembly ④.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

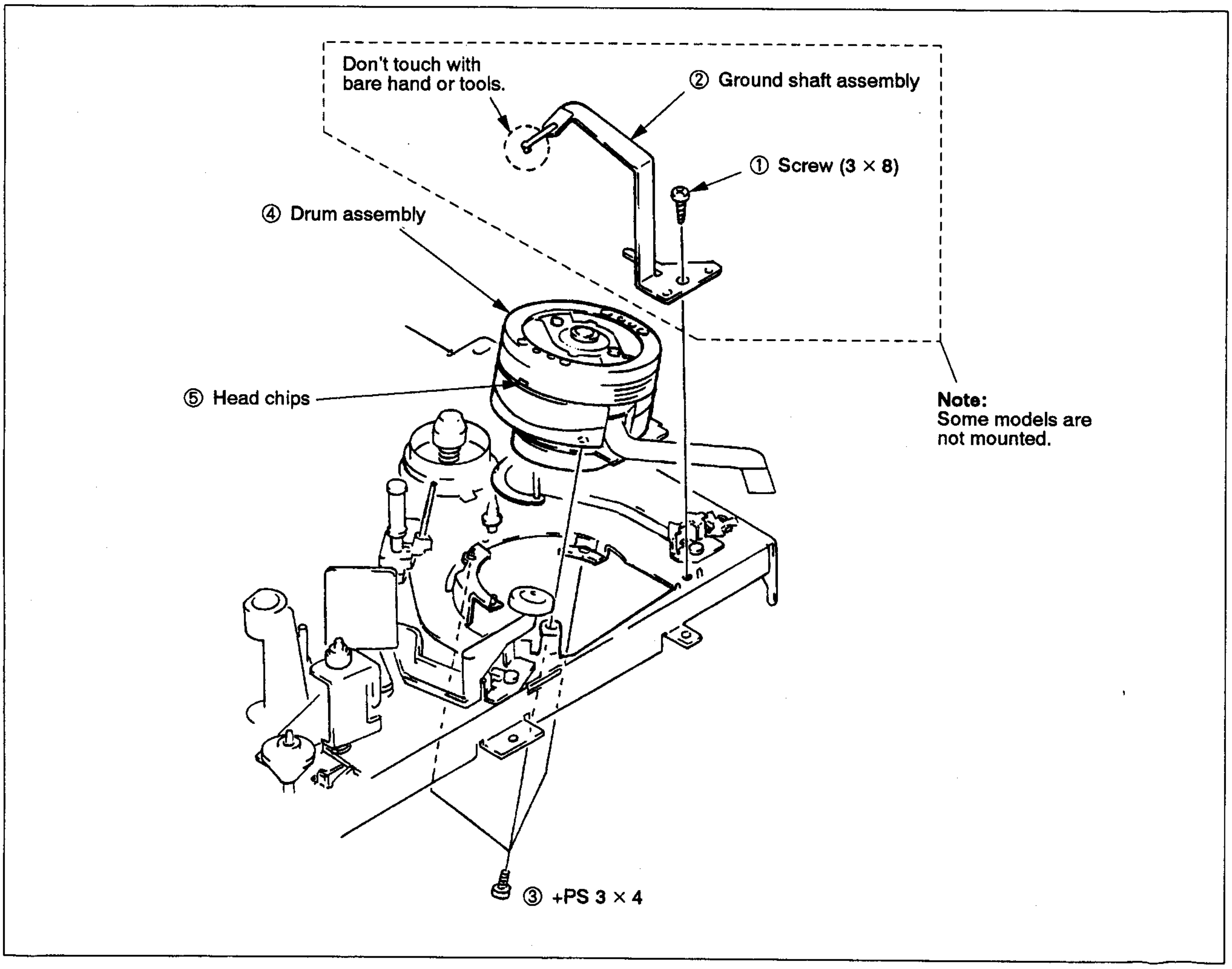

Don't touch with bare hand or tools.
② Ground shaft assembly
① Screw (3 × 8)
④ Drum assembly
⑤ Head chips
Note:
Some models are not mounted.
③ +PS 3 × 4

Fig. 3-2

3-3. TIMING BELT (Fig. 3-3)

1) Remove screw ① to remove tension vehicle arm assembly ②.
2) Remove timing belt ③.

[Note on Mounting]

- Tighten screw ① while pressing tension vehicle arm in the arrow Ⓐ direction.

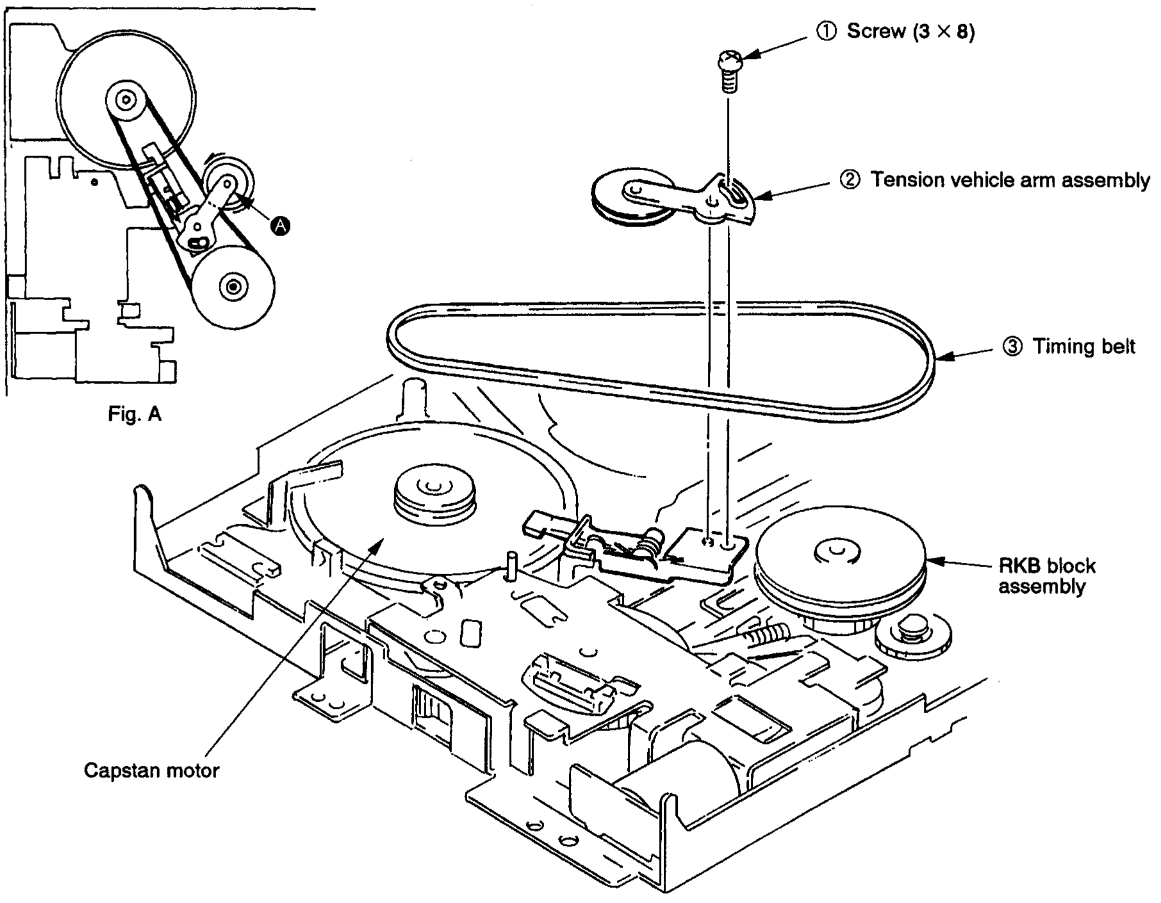

Ⓐ
① Screw (3 × 8)
② Tension vehicle arm assembly
③ Timing belt
RKB block assembly
Capstan motor

Fig. A

Fig. 3-3

3-4. CAP BRAKE ASSEMBLY (Fig. 3-4)

1) Remove tension vehicle arm assembly. (Refer to 3-3)
2) Remove torsion coil spring ① from portion Ⓐ to remove CAP brake assembly.

[Note on Mounting]

- Mount torsion coil spring ① to CAP brake assembly ② in the order Ⓐ and Ⓑ. (Fig. A)
- Put the fulcrum of CAP brake assembly ② to CAP brake shaft ③ and the tip of torsion coil spring to Ⓒ.
- Don't touch brake shoe Ⓓ with bare hand.

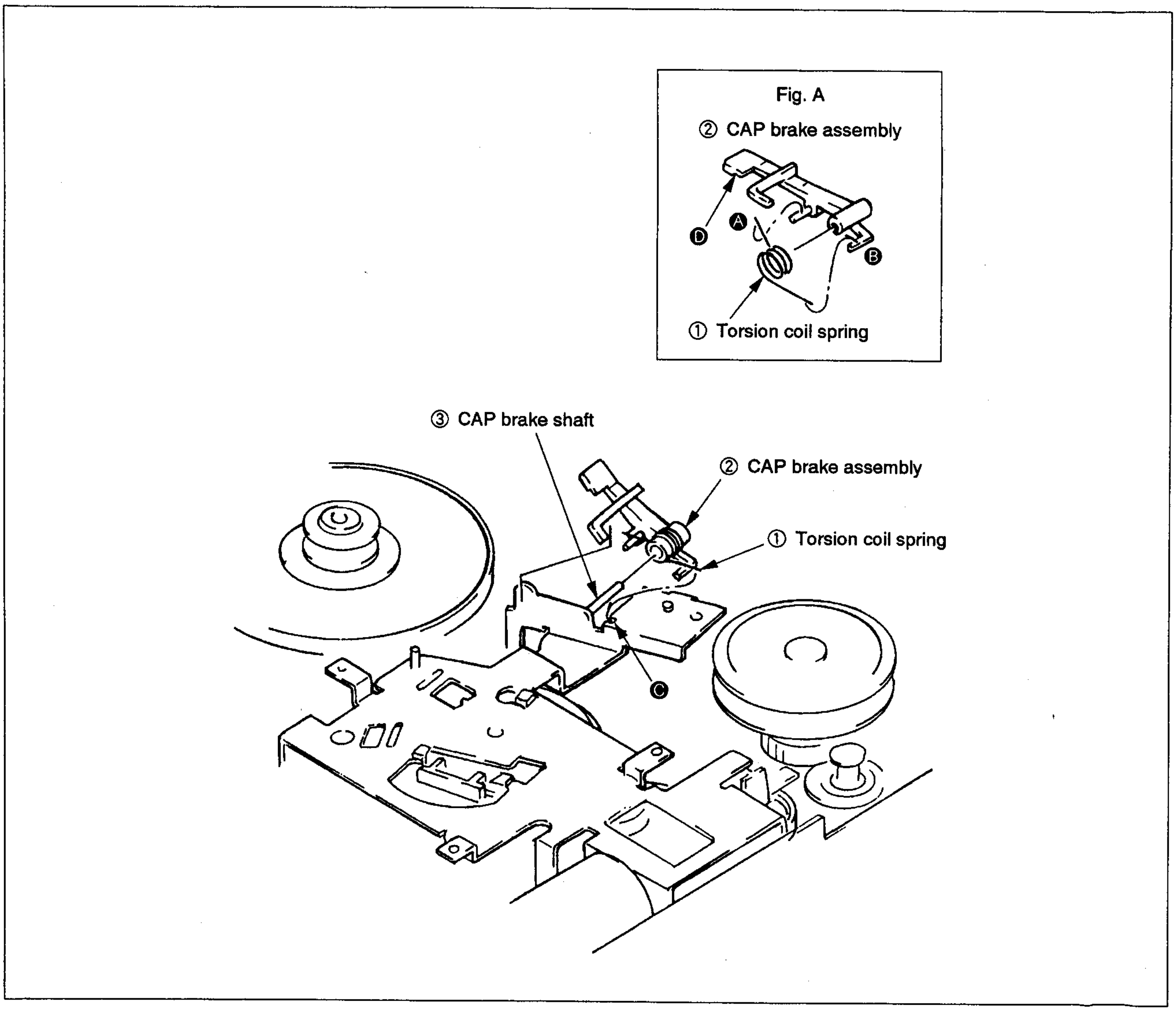


Fig. A
② CAP brake assembly
Ⓓ
Ⓐ
Ⓑ
① Torsion coil spring
③ CAP brake shaft
② CAP brake assembly
① Torsion coil spring
Ⓒ

Fig. 3-4

3-5. TG2 ROLLER, FE HEAD ASSEMBLY (Fig. 3-5)

1) Remove claw 🅐 to pull out TG2 roller ①.
2) Remove screw ② to pull out FE head assembly.

[Note on Mounting]

- Keep clean the surface contacts tape of TG2 roller ①.

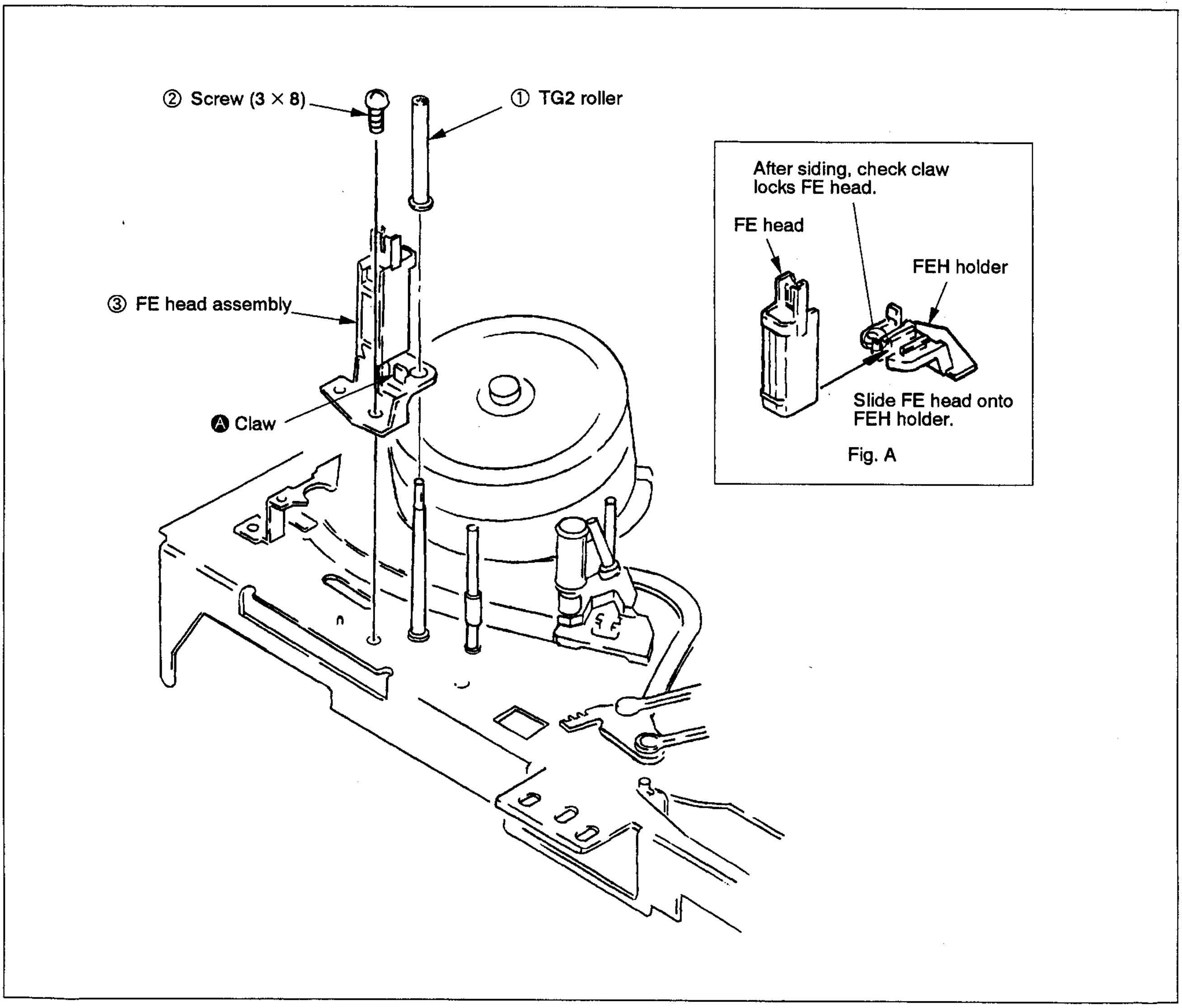

② Screw (3 × 8)
① TG2 roller
③ FE head assembly
🅐 Claw
After siding, check claw locks FE head.
FE head
FEH holder
Slide FE head onto FEH holder.
Fig. A

Fig. 3-5

3-6. PINCH PRESS BLOCK ASSEMBLY, ELEVATOR GEAR (Fig. 3-6)

1) Remove E ring ① to pull out pinch press block assembly ②.
2) Remove lid opener ③ by pressing claw Ⓐ in the arrow Ⓑ direction.
3) Pull out elevator gear ④.

[Note on Mounting]

- Apply grease FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions.
- Be sure to match the phase Ⓒ between elevator gear ④ and press gear ⑤ on mounting elevator gear ④.

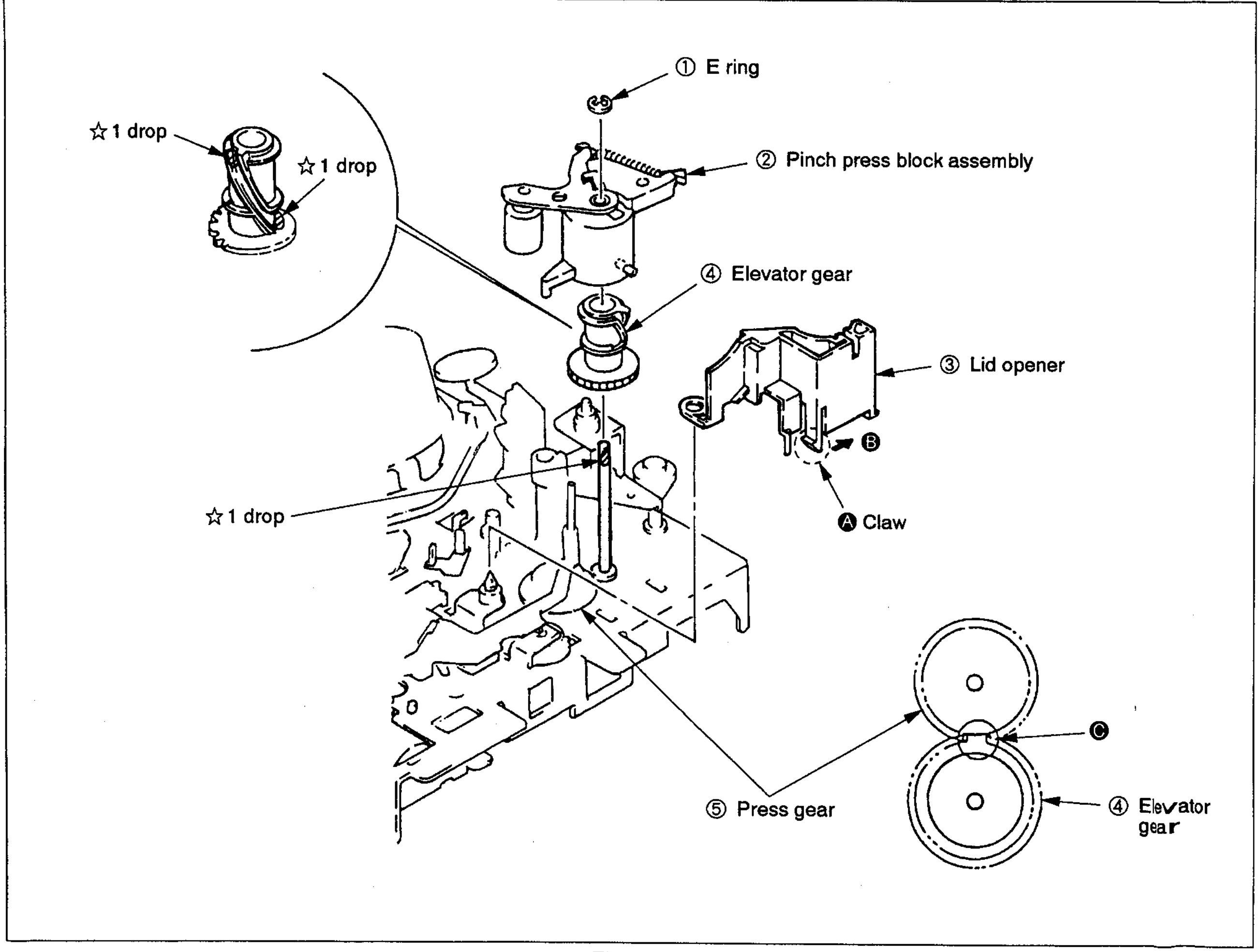

① E ring
☆1 drop
☆1 drop
② Pinch press block assembly
④ Elevator gear
③ Lid opener
Ⓑ
Ⓐ Claw
☆1 drop
Ⓒ
⑤ Press gear
④ Elevator gear

Fig. 3-6

3-7. ACE BLOCK ASSEMBLY (Fig. 3-7)

1) Move torsion coil spring (ACE) ① in the arrow Ⓐ direction.
2) Remove ACE adjustment screw ②.
3) Remove AC height adjustment nut ③ to pull out ACE block assembly ④.

[Note on Mounting]

- Keep clean the surface contacts tape of ACE block assembly ④.
- Be sure to hang torsion coil spring (ACE) ① in the arrow Ⓑ direction.
- Set ACE adjustment screw ② to the height as shown in Fig. A.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.
- After adjustment apply Screw Lock G (1401B) (Jig Ref. No. J-14) at ☆ marked portion.

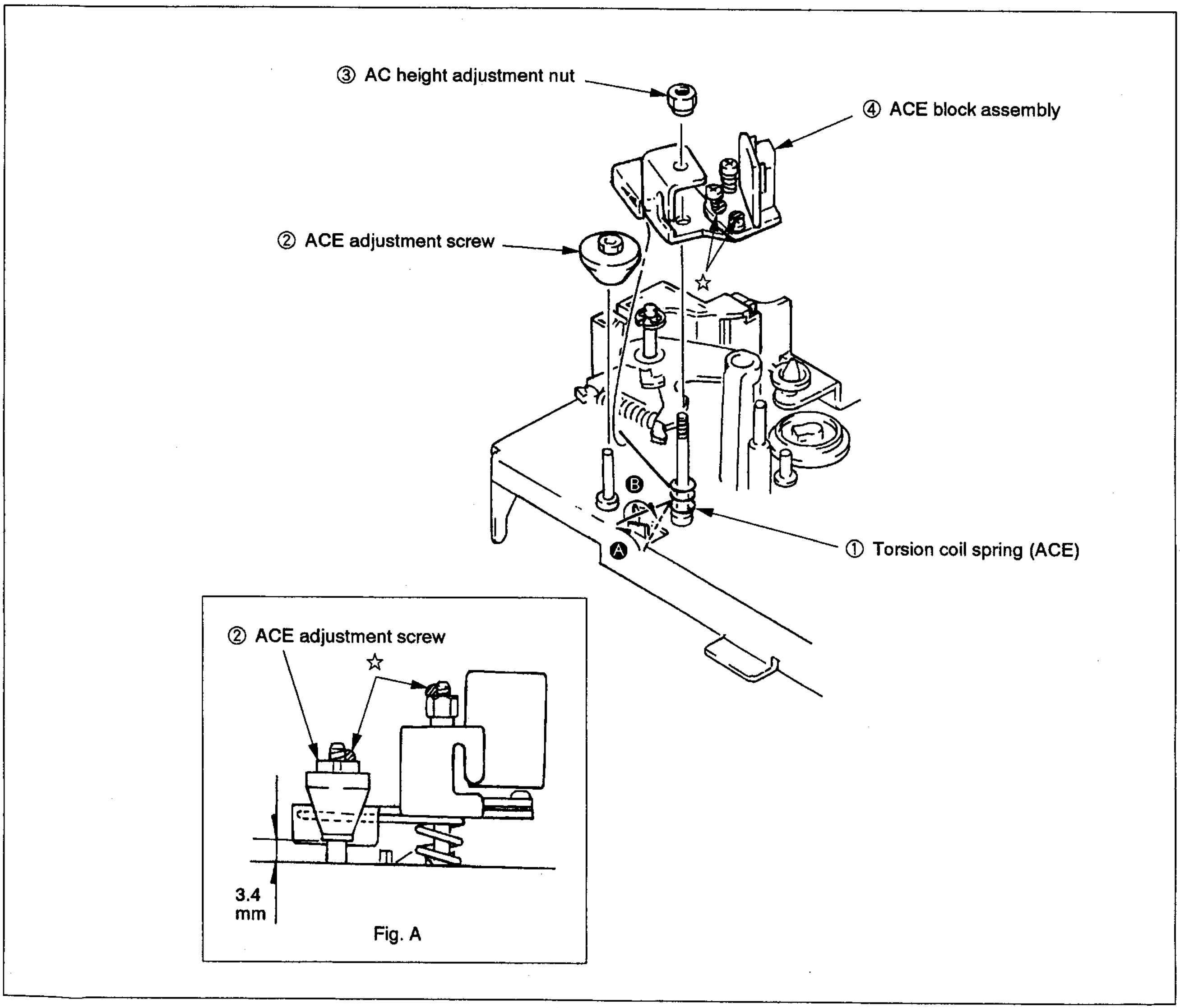

③ AC height adjustment nut
④ ACE block assembly
② ACE adjustment screw
☆
Ⓑ
Ⓐ
① Torsion coil spring (ACE)
② ACE adjustment screw
☆
3.4 mm
Fig. A

Fig. 3-7

3-8. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Fig. 3-8)

1) Loosen screw ① and pull out. TG3 guide roller assembly ② by turning it in the arrow Ⓐ direction.
2) Loosen screw ③ and pull out TG6 guide roller assembly ④ by turning it in the arrow Ⓑ direction.

[Note on Mounting]

- Keep clean the surface contacts tape of TG3 and TG6 guide roller assemblies ②, ④.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

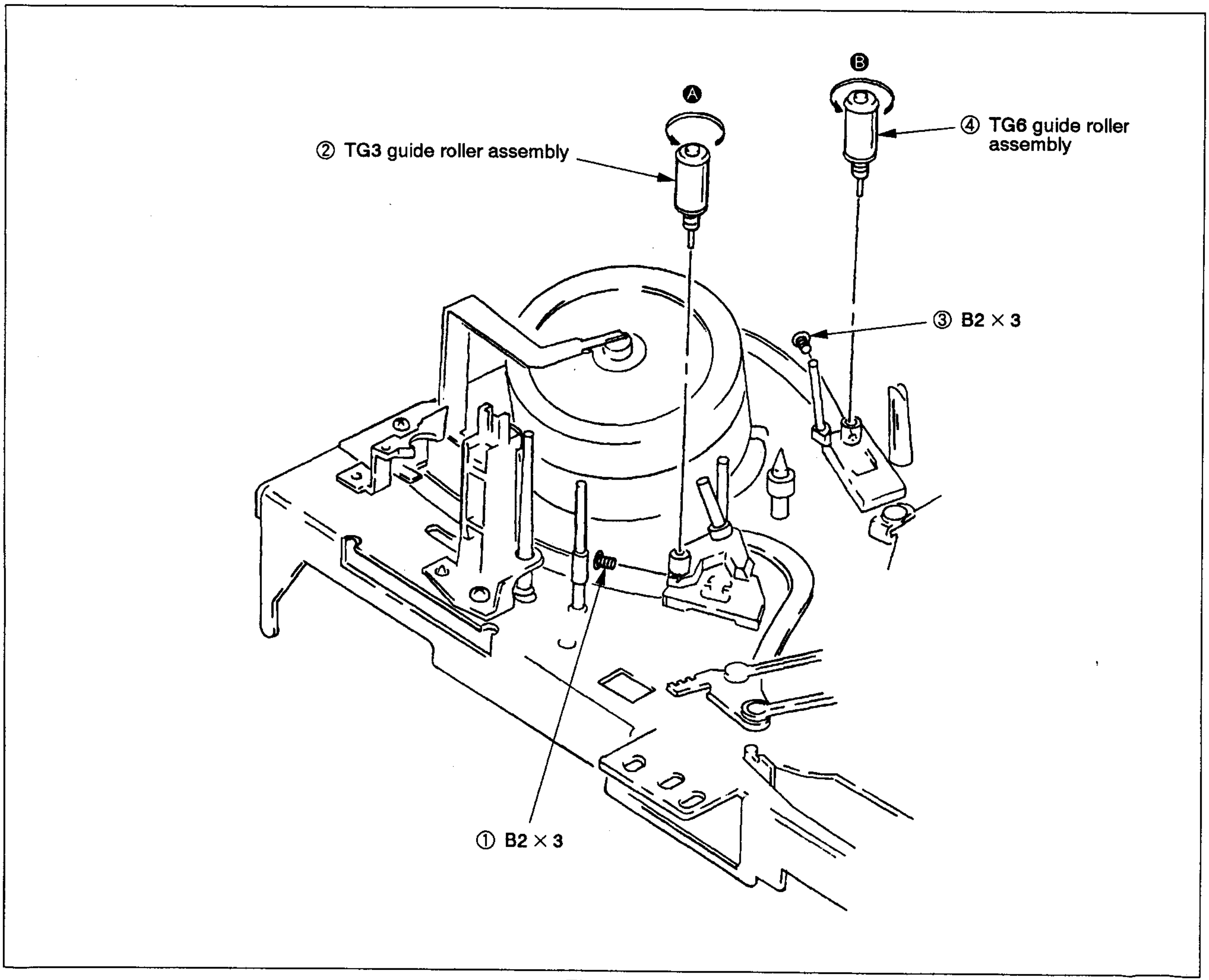

Ⓑ
Ⓐ
④ TG6 guide roller assembly
② TG3 guide roller assembly
③ B2 × 3
① B2 × 3

Fig. 3-8

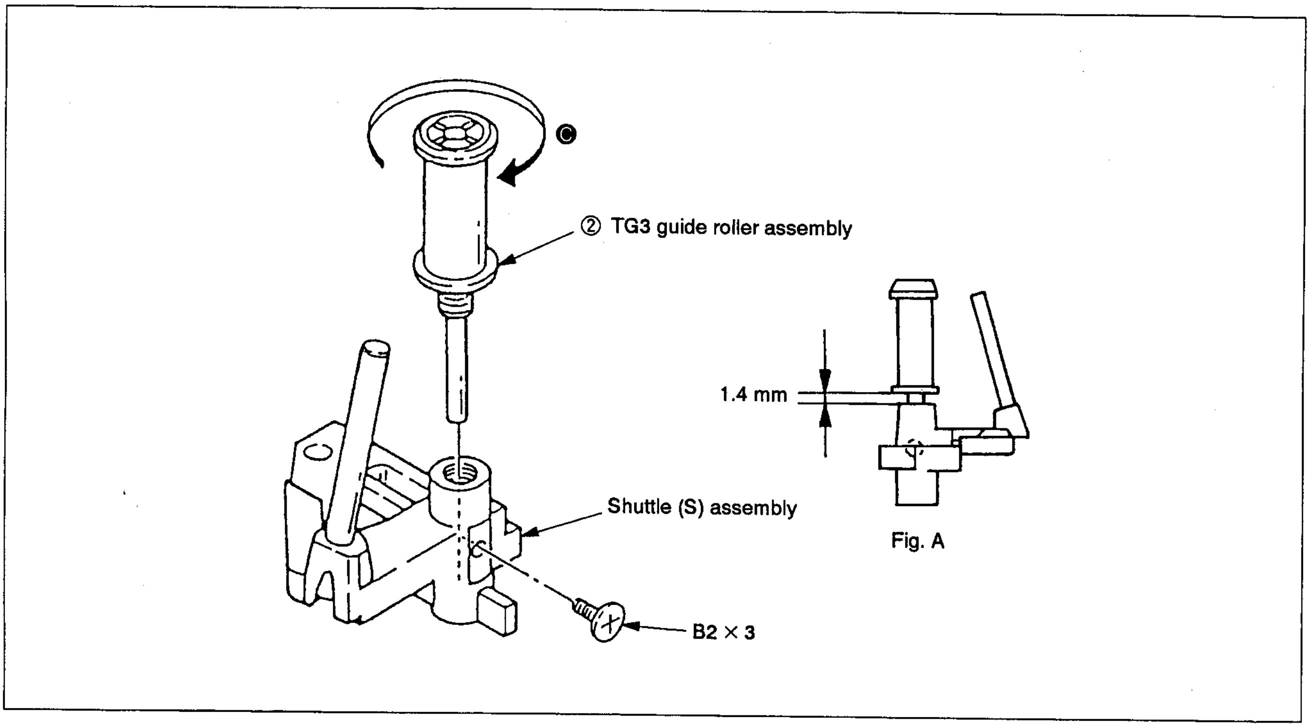

Ⓒ
② TG3 guide roller assembly
1.4 mm
Shuttle (S) assembly
Fig. A
B2 × 3

Fig. 3-9

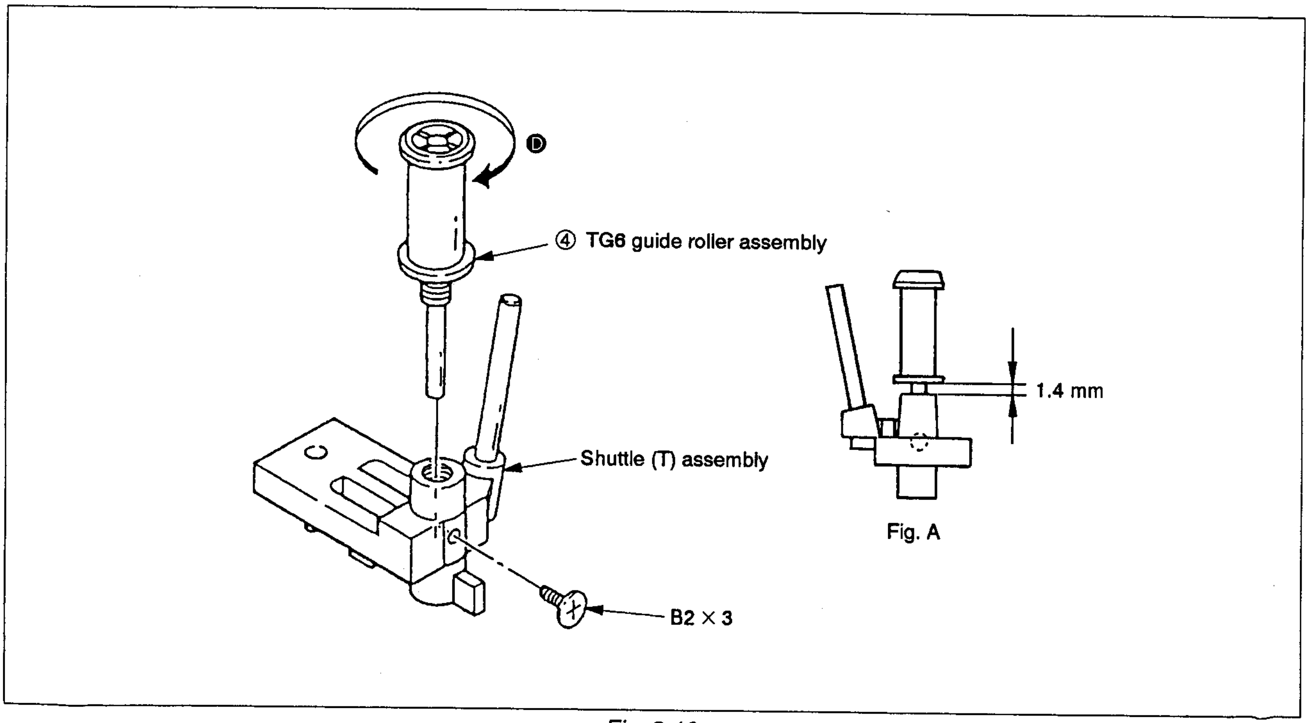

Ⓓ
④ TG6 guide roller assembly
1.4 mm
Shuttle (T) assembly
Fig. A
B2 × 3

Fig. 3-10

3-9. CAPSTAN MOTOR (Fig. 3-11)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove screws ① to pull out capstan motor ②.

[Note on Mounting]

- Keep clean the surface contacts tape of capstan motor ②.
- On tightening screws ①, first tighten screw A temporarily, next tighten screws in the order B to C to A.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

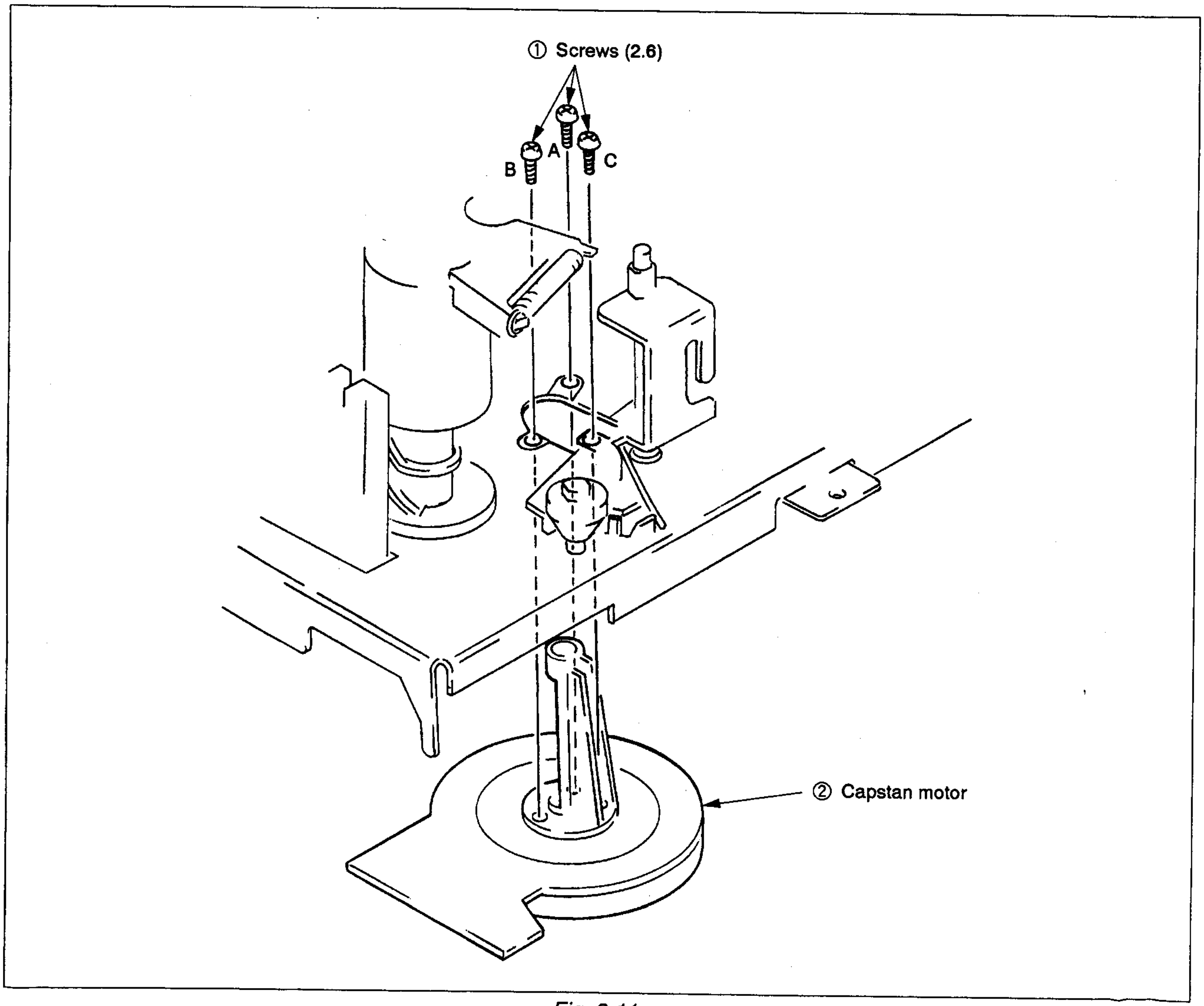


Fig. 3-11

3-10. MAIN BRAKE ASSEMBLIES S AND T (Fig. 3-12)

1) Remove tension spring ①.
2) Remove stopper washer (2) ② to remove neutrality arm ③.
3) Remove pendulum compulsion arm ④ and tension coil spring ⑤.
4) Remove stopper washer (2) ⑥ to remove main brake S assembly ⑦.
5) Remove stopper washer (2) ⑧ to remove main brake T assembly ⑨.

[Note on Mounting]

- Don't touch brake shoes Ⓐ and Ⓑ with bare hand.
- Apply FLOIL FG-055G (Jig Ref. No. J-12) to ☆ marked portions.

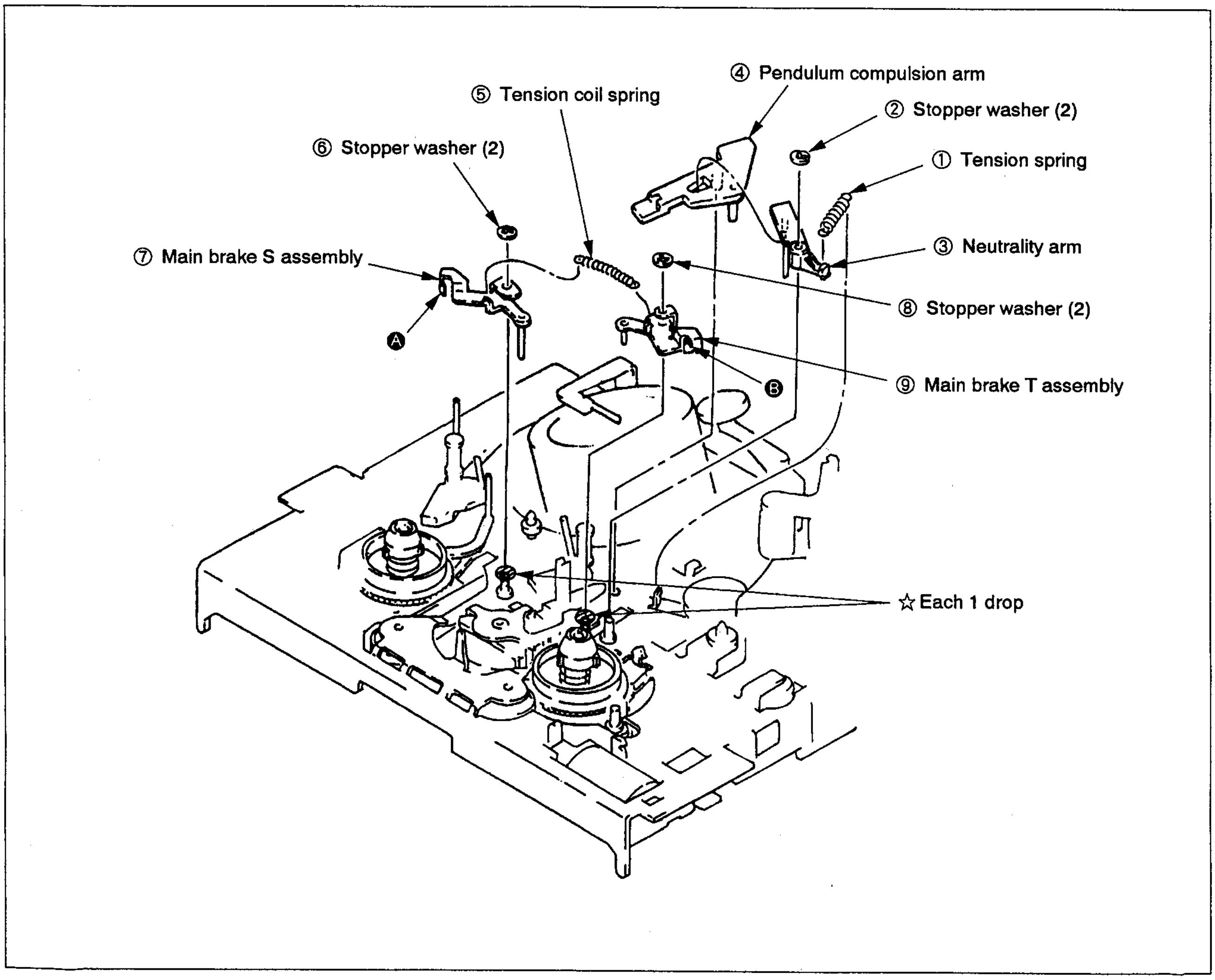

④ Pendulum compulsion arm
⑤ Tension coil spring
② Stopper washer (2)
⑥ Stopper washer (2)
① Tension spring
⑦ Main brake S assembly
③ Neutrality arm
⑧ Stopper washer (2)
Ⓐ
Ⓑ
⑨ Main brake T assembly
☆Each 1 drop

Fig. 3-12

3-11. SOFT BRAKE T ASSEMBLY (Fig. 3-13)

1) Remove pinch press block assembly. (Refer to 3-6.)
2) Remove lid opener ① carefully not to damage claw Ⓐ.
3) Remove tension spring ② from side Ⓑ to pull out soft brake T assembly ③.

[Note on Mounting]

- Don't touch brake shoes Ⓒ with bare hand.

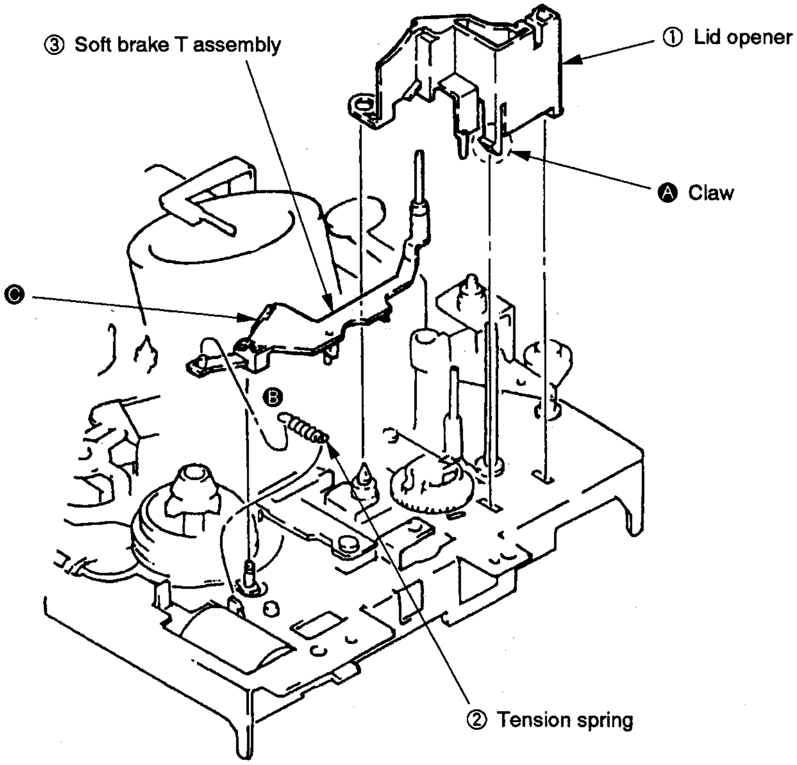

③ Soft brake T assembly
① Lid opener
Ⓐ Claw
Ⓒ
Ⓑ
② Tension spring

Fig. 3-13

3-12. RVS BRAKE ARM ASSEMBLY, REEL TABLE (T) ASSEMBLY (Fig. 3-14)

1) Remove main brake T assembly. (Refer to 3-10.)
2) Remove soft brake T assembly. (Refer to 3-11.)
3) Remove tension coil spring ① in the order 🅐 to 🅑.
4) Remove RVS brake arm assembly ②.
5) Remove stopper washer (2) ③ to pull out reel table (T) assembly ④.

[Note on Mounting]

- Apply one drop of Diamond Oil NT-68 (Jig Ref. No. J-13) to ☆ marked portion before mounting reel table (T) assembly ④. (Fig. A)
- Don't touch the hatched portion on reel table (T) assembly ④ and brake shoe 🅒 of RVS brake arm assembly ② with bare hand.

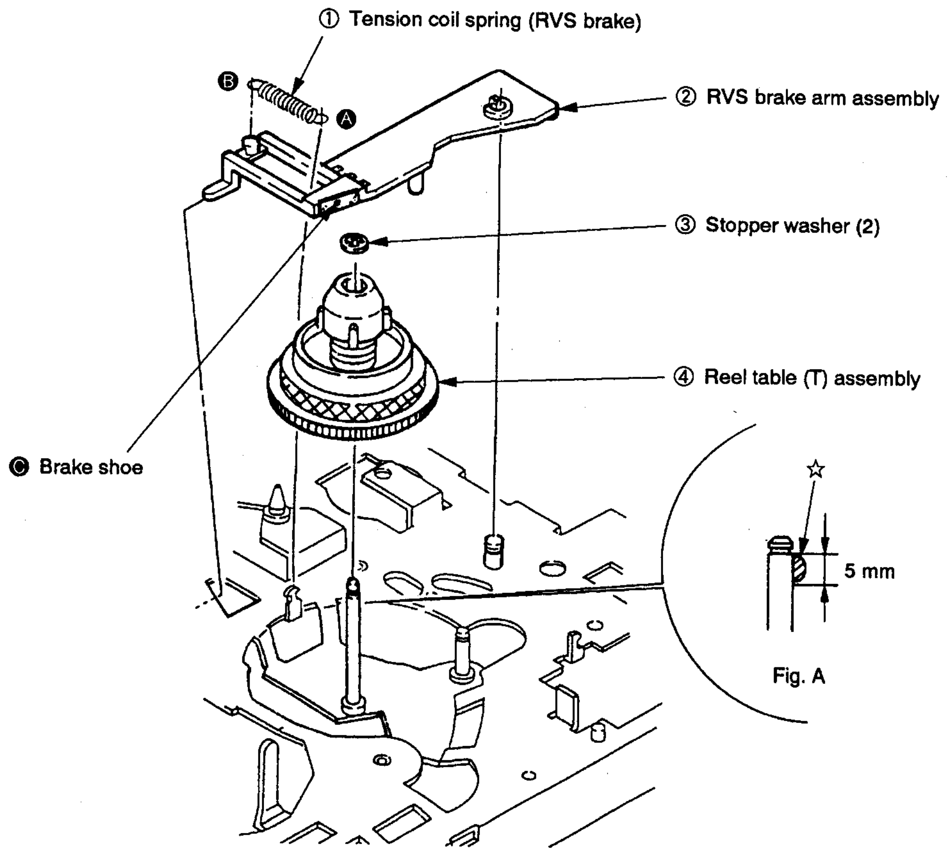

① Tension coil spring (RVS brake)
🅑
🅐
② RVS brake arm assembly
③ Stopper washer (2)
④ Reel table (T) assembly
🅒 Brake shoe
☆
5 mm
Fig. A

Fig. 3-14

3-13. TG8 ASSEMBLY (Fig. 3-15)

1) Remove TG8 retainer ① to pull out TG8 assembly ②.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portion.
- Keep clean the surface contacts tape of TG8 assembly ②.
- Be careful not to change the shape of TG8 retainer ①.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

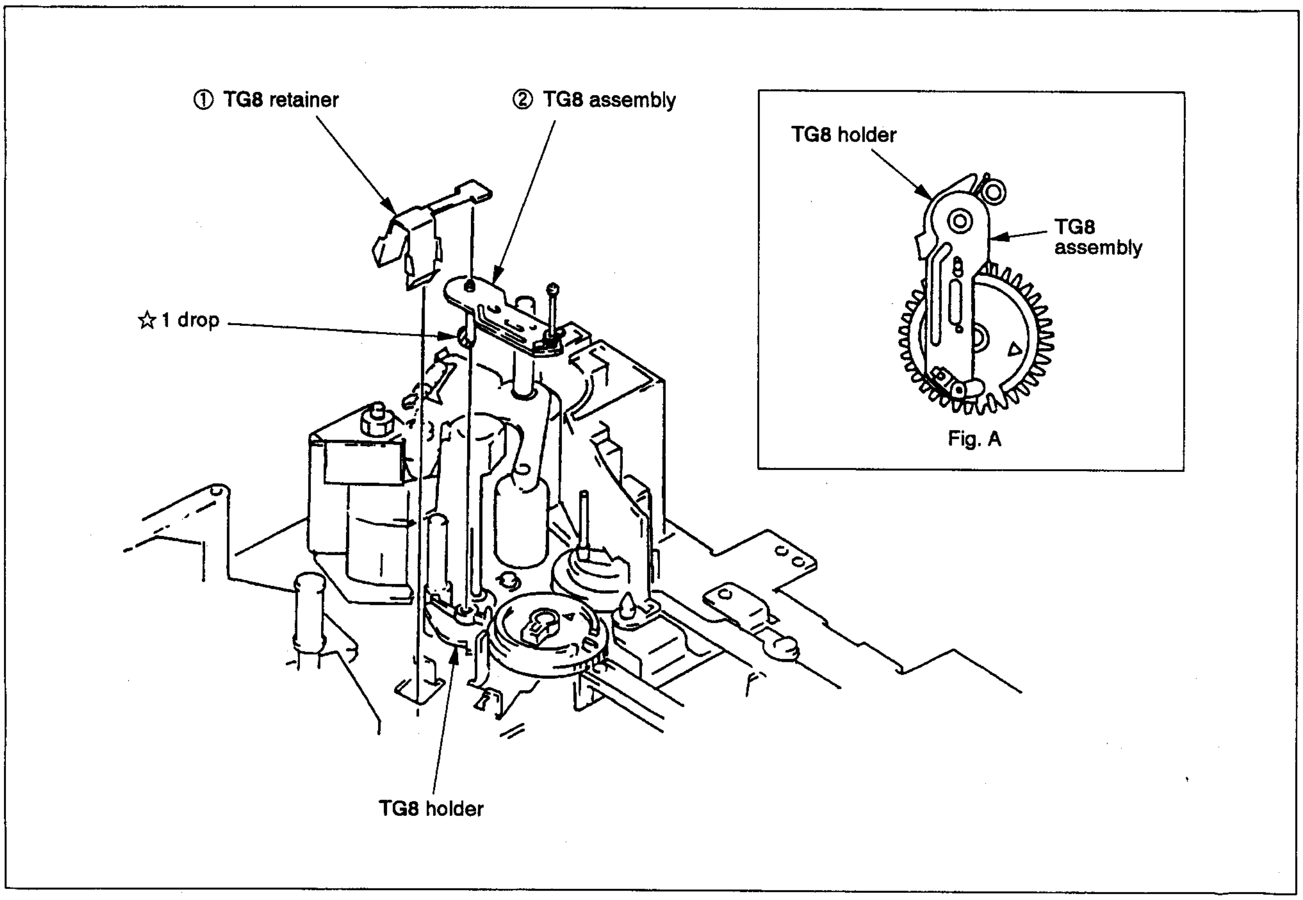

① TG8 retainer
② TG8 assembly
☆1 drop
TG8 holder
TG8 holder
TG8 assembly
Fig. A

Fig. 3-15

3-14. TG8 HOLDER (Fig. 3-16)

1) Remove TG8 assembly. (Refer to 3-13)
2) Pull out TG8 holder ①.

[Note on Mounting]

- Be careful about the direction of TG8 holder ①. (🅐 of Fig. A)

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

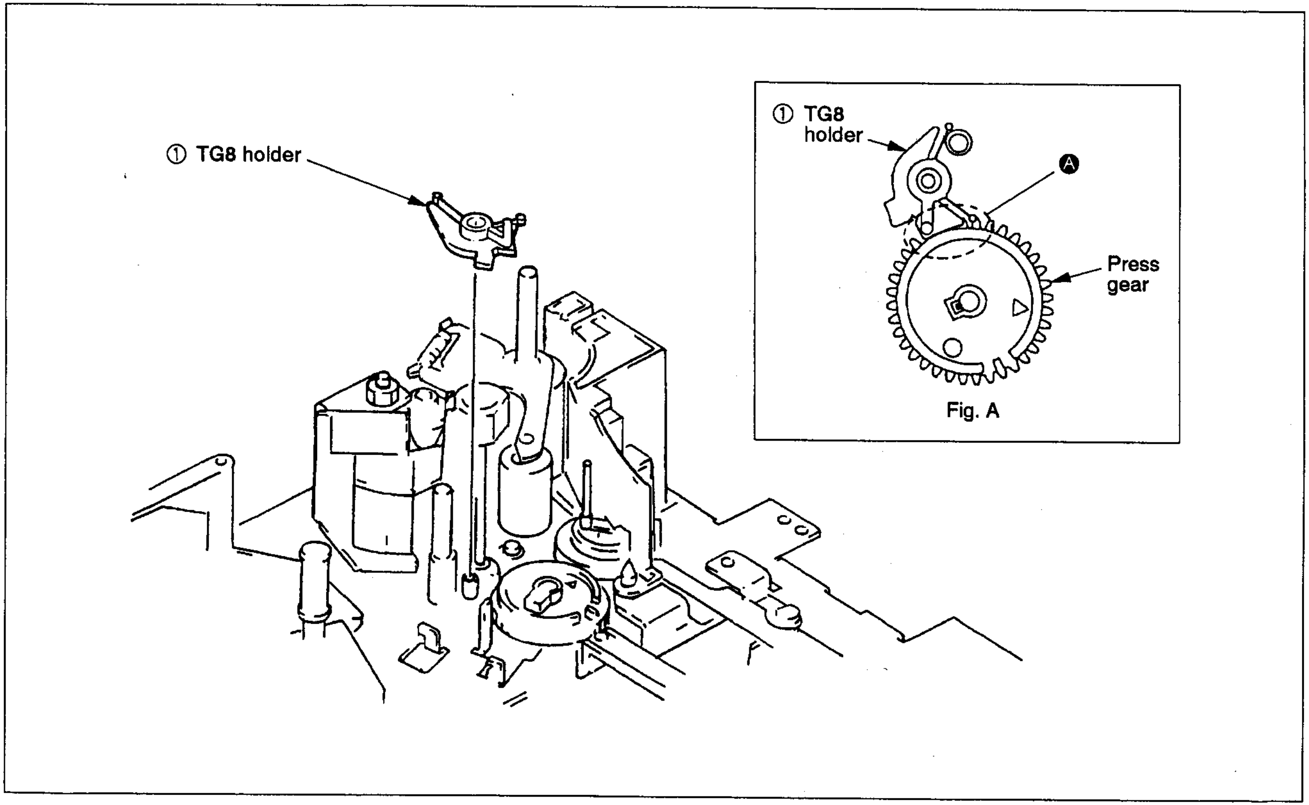

① TG8 holder
① TG8 holder
🅐
Press gear
Fig. A

Fig. 3-16

3-15. TG8 AND PRESS GEARS (Fig. 3-17)

1) Remove pinch press block assembly. (Refer to 3-6.)
2) Remove soft brake T assembly. (Refer to 3-11.)
3) Remove TG8 assembly. (Refer to 3-13.)
4) Remove TG8 holder. (Refer to 3-14.)
5) Pull out TG8 gear ① or press gear ②.

[Note on Mounting]

- Adjust the holes on gears to the holes on chassis. (Fig. A)
- Adjust the arrows carved on gears each other. (Fig. A)

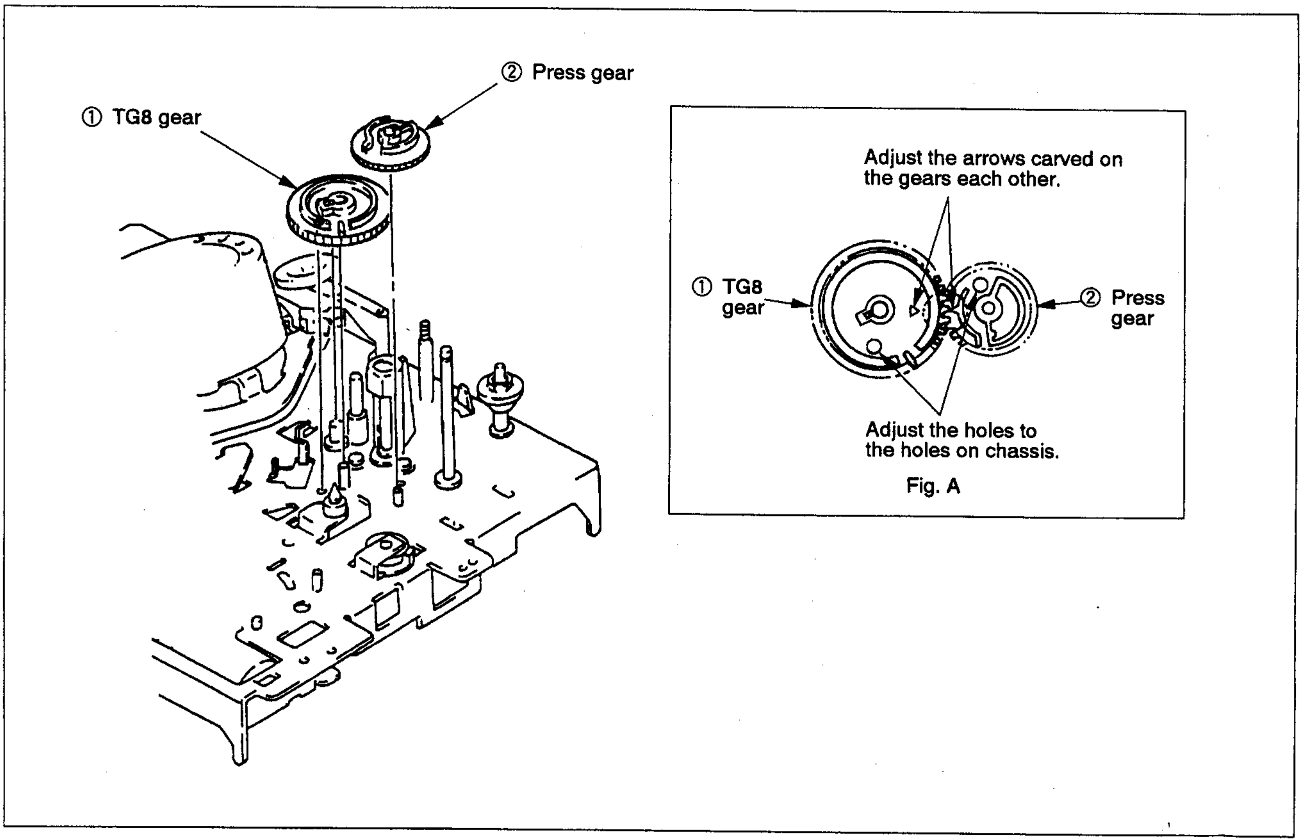

② Press gear
① TG8 gear
Adjust the arrows carved on the gears each other.
① TG8 gear
② Press gear
Adjust the holes to the holes on chassis.
Fig. A

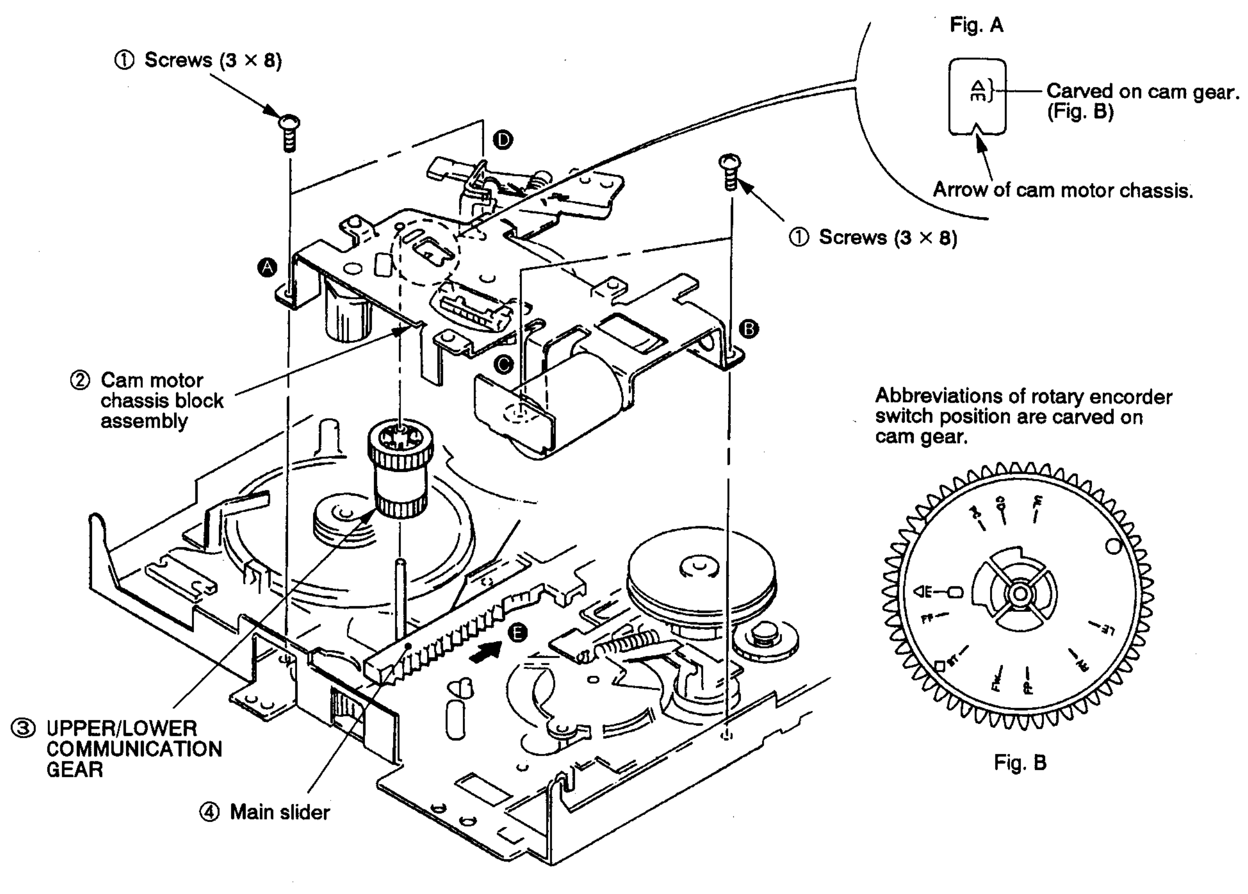
Fig. 3-17

3-16. CAM MOTOR CHASSIS BLOCK ASSEMBLY, UPPER/LOWER COMMUNICATION GEAR (Fig. 3-18)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove screws ① to remove cam motor chassis assembly ②.
4) Pull out upper/lower communication gear ③.

[Note on Mounting]

- First, check main slider ④ slides fully in the arrow 🅔 direction.
- Set rotary encoder switch position to "E" seen from the window of cam motor chassis. (Fig. A)
- Tighten screws ① in the order 🅐 to 🅑 to 🅒 to 🅓.



① Screws (3 × 8)
🅓
🅐
① Screws (3 × 8)
🅑
🅒
② Cam motor chassis block assembly
🅔
③ UPPER/LOWER COMMUNICATION GEAR
④ Main slider
Fig. A
Carved on cam gear. (Fig. B)
Arrow of cam motor chassis.
Abbreviations of rotary encorder switch position are carved on cam gear.
Fig. B

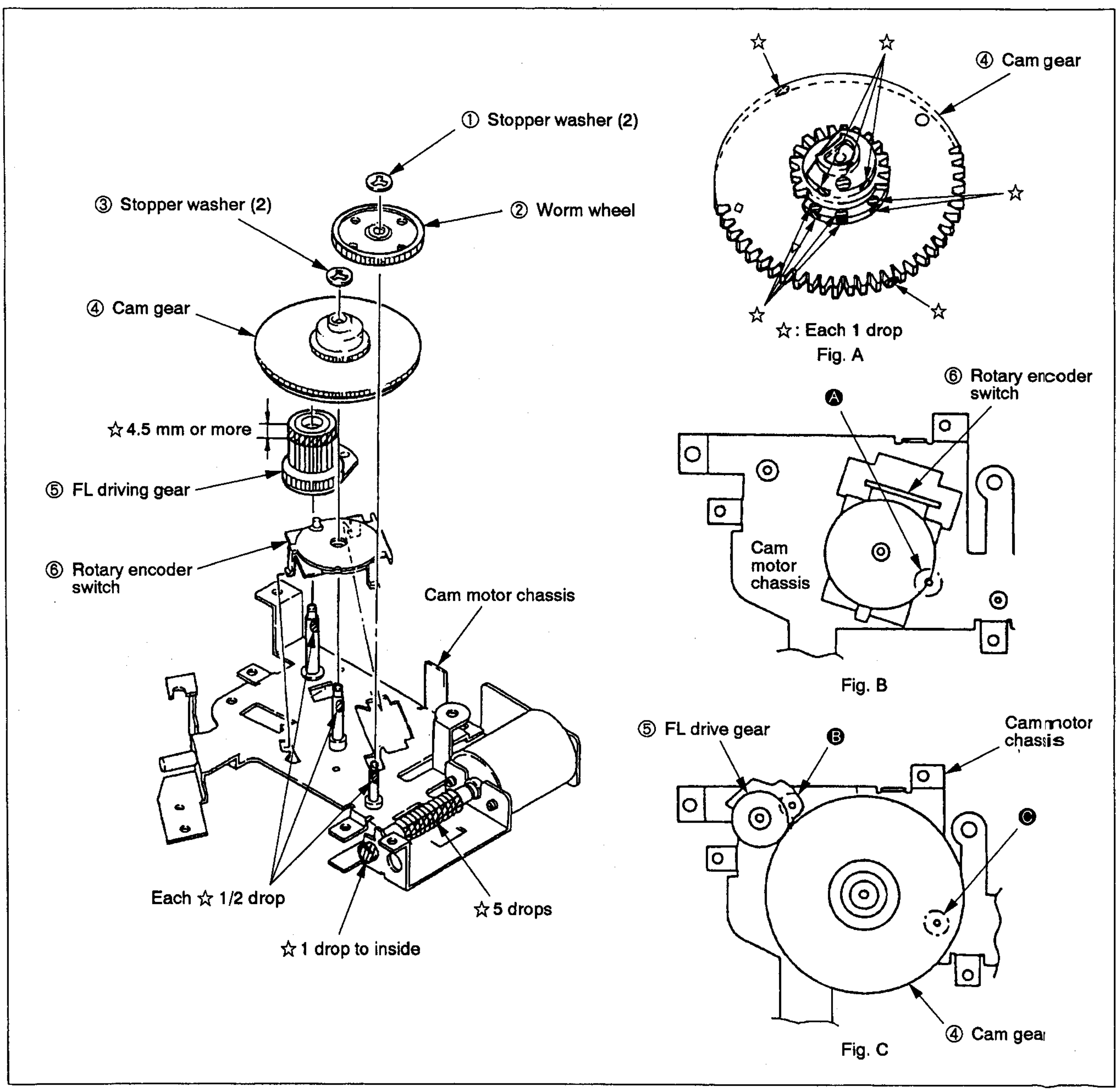
Fig. 3-18

3-17. ROTARY ENCODER SWITCH (Fig. 3-19)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly (Refer to 3-15.) and turn upside on the bottom.
4) Remove stopper washer (2) ① to pull out worm wheel ②.
5) Remove stopper washer (2) ③ to pull out cam gear ④.
6) Pull out FL driving gear ⑤ and rotary encoder switch ⑥.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions. (Fig. 3-19, A)
- Adjust the hole 🅐 to the hole on cam motor chassis. (Fig. B)
- Adjust the holes 🅑 and 🅒 to the hole on cam motor chassis. (Fig. C)



① Stopper washer (2)
③ Stopper washer (2)
② Worm wheel
④ Cam gear
☆4.5 mm or more
⑤ FL driving gear
⑥ Rotary encoder switch
Cam motor chassis
Each ☆ 1/2 drop
☆5 drops
☆1 drop to inside
☆
④ Cam gear
☆: Each 1 drop
Fig. A
⑥ Rotary encoder switch
🅐
Cam motor chassis
Fig. B
⑤ FL drive gear
🅑
Cam motor chassis
🅒
④ Cam gear
Fig. C

Fig. 3-19

3-18. MAIN SLIDER (Fig. 3-20)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove screw ① to remove retainer ②.
5) Pull out main slider ③.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) as shown in Fig. A.
- At the last, slide main slider fully in the arrow 🅐 direction.

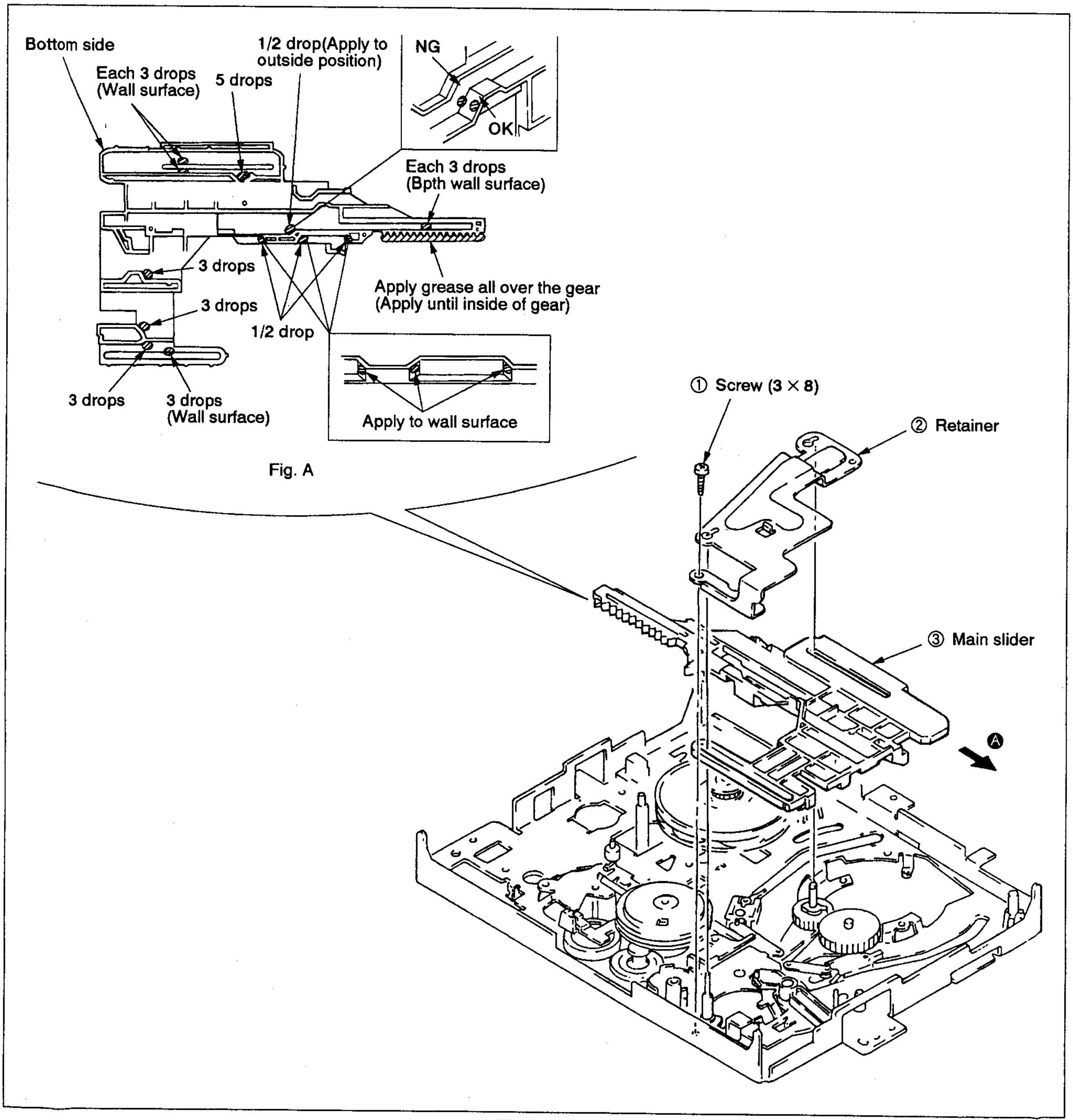

Bottom side
Each 3 drops (Wall surface)
5 drops
1/2 drop(Apply to outside position)
NG
OK
Each 3 drops (Bpth wall surface)
3 drops
3 drops
1/2 drop
Apply grease all over the gear (Apply until inside of gear)
3 drops
3 drops (Wall surface)
Apply to wall surface
Fig. A
① Screw (3 × 8)
② Retainer
③ Main slider
🅐

Fig. 3-20

3-19. SHUTTLE T BLOCK AND LOADING GEAR T BLOCK ASSEMBLIES (Fig. 3-21)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-18.)
5) Remove screw ① to remove loading leaf (T) spring ② and shuttle T block assembly ③.
6) Pull out loading gear T block assembly ④.

[Note on Mounting]

- Adjust the phase 🅐 between loading gear (T) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle T block assembly ③.

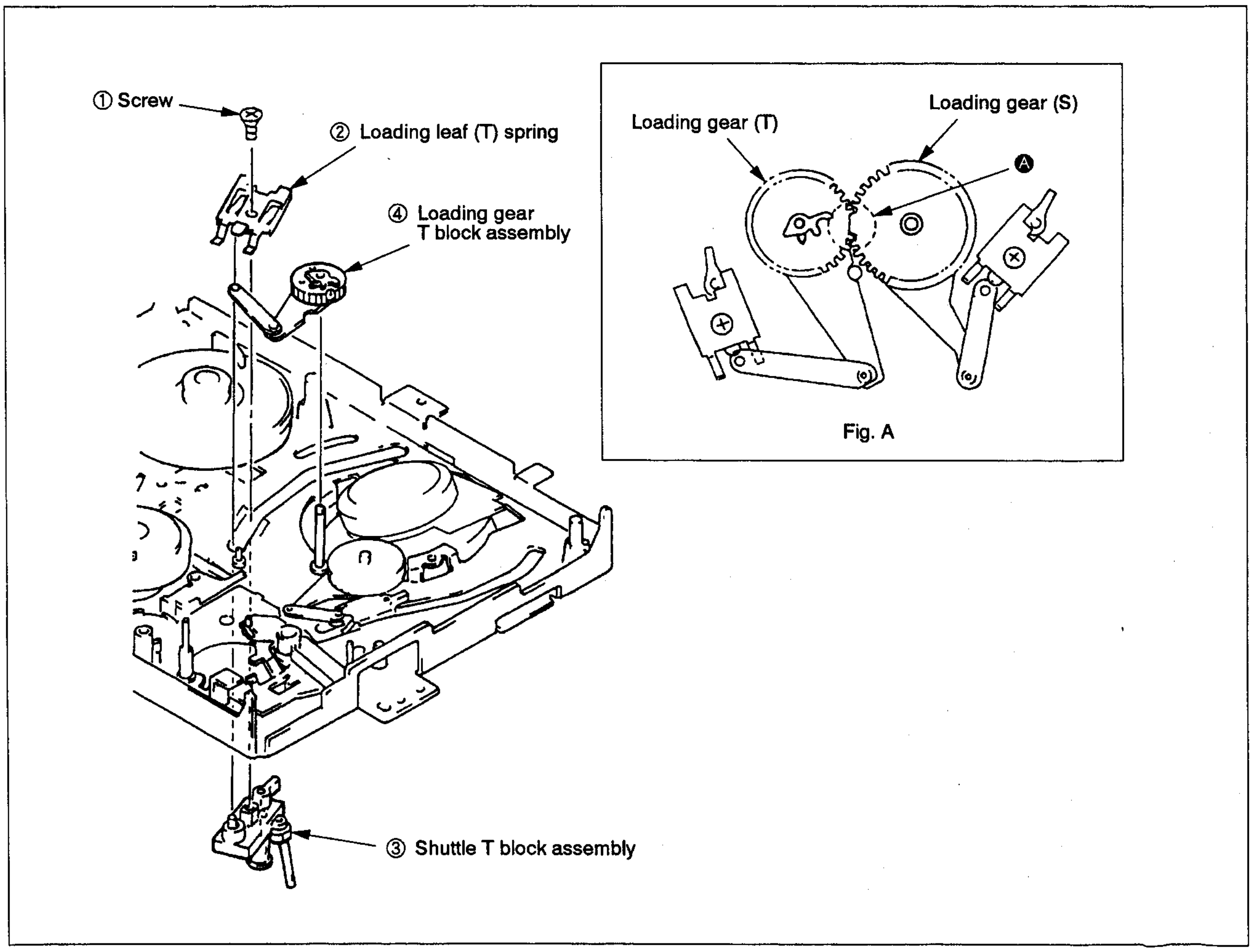

① Screw
② Loading leaf (T) spring
④ Loading gear T block assembly
③ Shuttle T block assembly
Loading gear (T)
Loading gear (S)
🅐
Fig. A

Fig. 3-21

3-20. SHUTTLE S BLOCK AND LOADING GEAR S BLOCK ASSEMBLIES (Fig. 3-22)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-15.)
5) Remove screw ① to remove loading leaf (S) spring ② and shuttle S block assembly ③.
6) Pull out loading gear S block assembly ④.

[Note on Mounting]

- Adjust the phase 🅐 between loading gear (S) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle S block assembly ③.

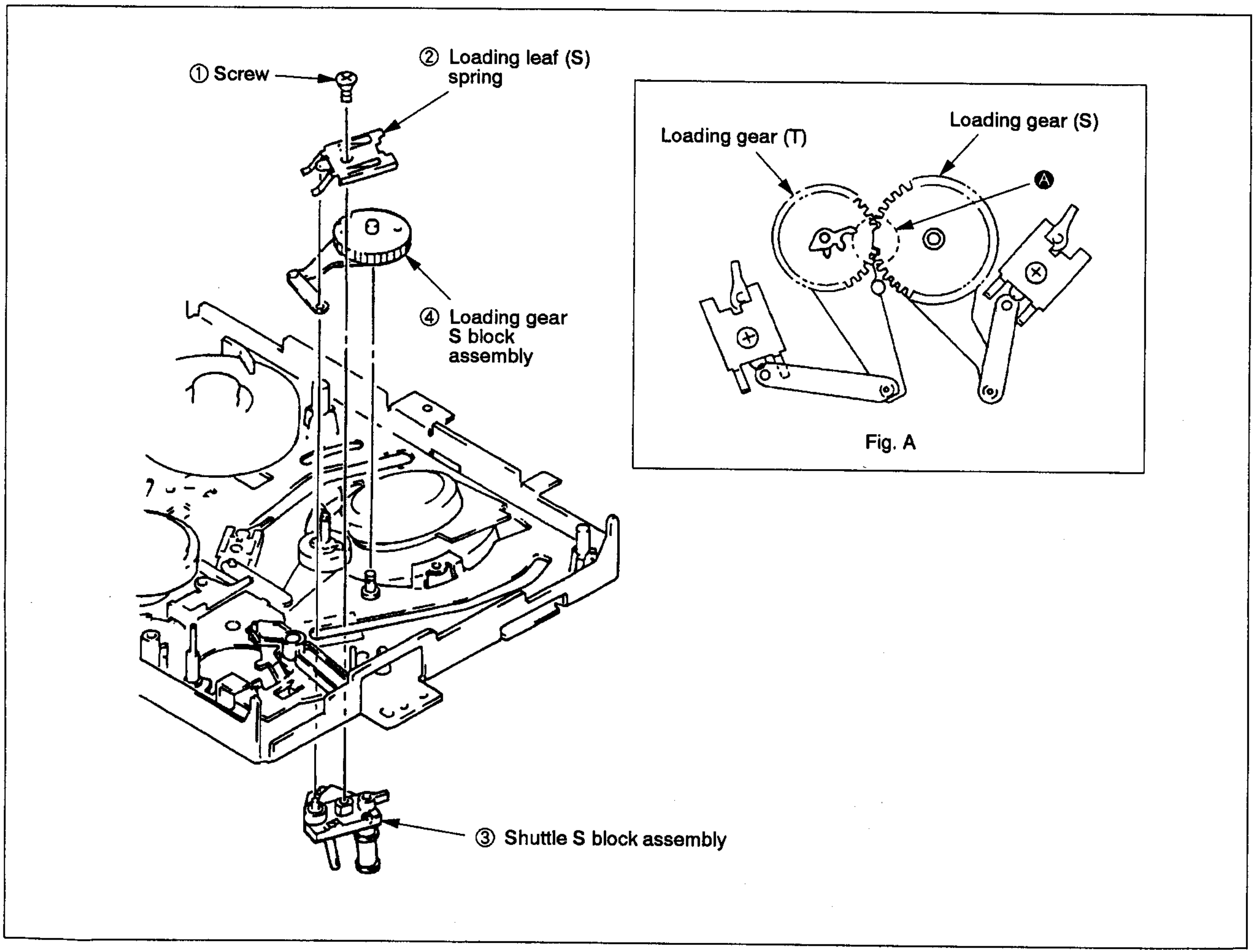

① Screw
② Loading leaf (S) spring
④ Loading gear S block assembly
③ Shuttle S block assembly
Loading gear (T)
Loading gear (S)
🅐
Fig. A

Fig. 3-22

3-21. REEL TABLE (S) ASSEMBLY (Fig. 3-23)

1) Remove tension spring ① from the chassis side.
2) Remove stopper washer (2) ② to pull out soft brake (S) ③.
3) Move TG1 band ④ over the reel table.
4) Remove stopper washer (2) ⑤.
5) While pressing main brake S assembly ⑥, pull out reel table (S) assembly ⑦.

[Note on Mounting]

- Apply one drop of Diamond Oil NT-68 (Jig Ref. No. J-13) to ☆ marked portion before mounting reel table (S) assembly ⑥. (Fig. A)
- Don't touch the hatched portion on reel table (S) assembly ⑥ with bare hand.

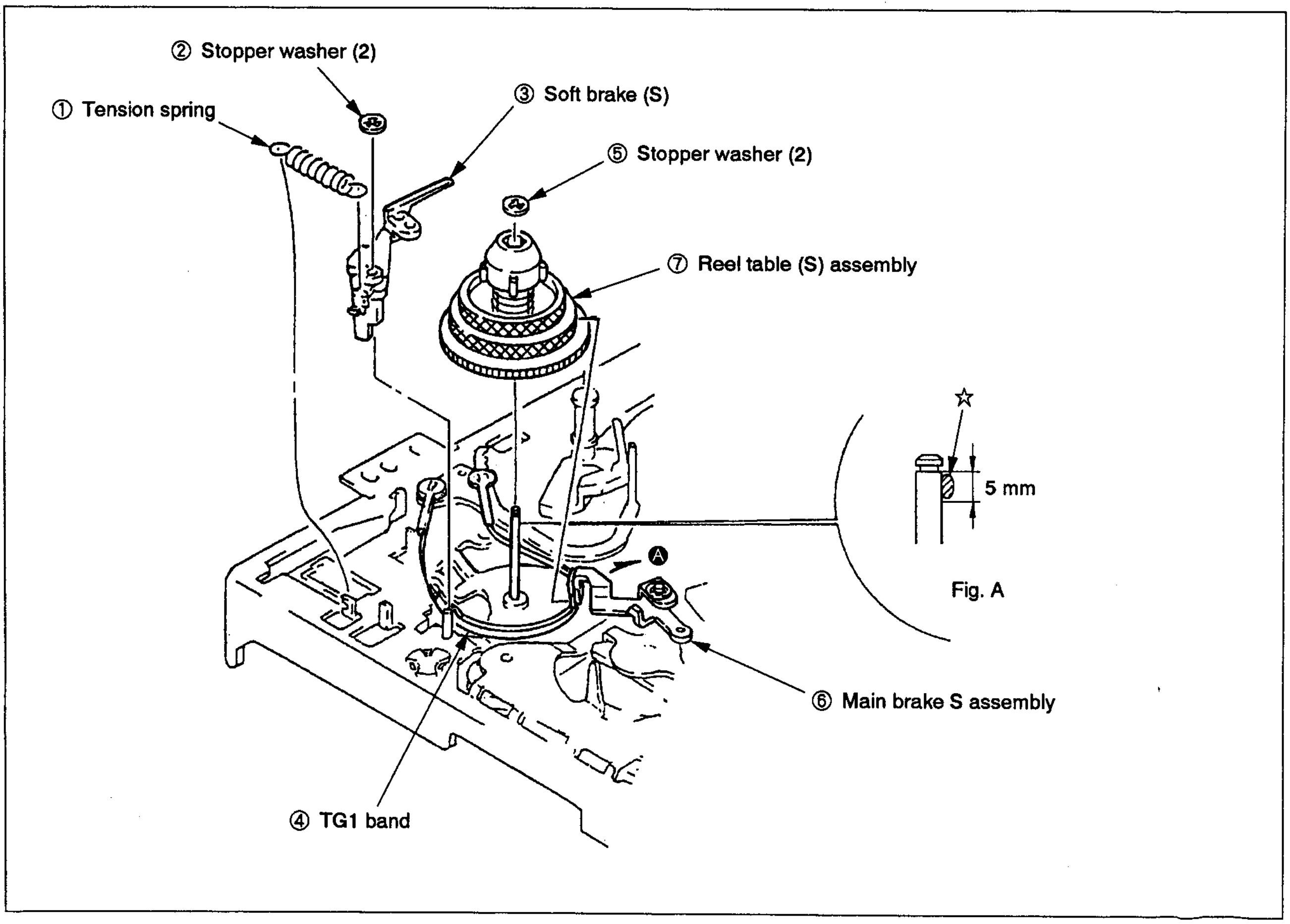

② Stopper washer (2)
① Tension spring
③ Soft brake (S)
⑤ Stopper washer (2)
⑦ Reel table (S) assembly
☆
5 mm
Fig. A
Ⓐ
⑥ Main brake S assembly
④ TG1 band

Fig. 3-23

3-22. TG1 ASSEMBLY (Fig. 3-24)

1) Set the mechanism to the loading-end condition referring to 1-1. (Cam gear indicates "LE". (Refer to Fig. A and B of Fig. 3-18.))
2) Remove tension spring ① in the order Ⓐ to Ⓑ.
3) Remove stopper washer (2) ② to pull out TG1 assembly ③.

[Note on Mounting]

- Apply one drop of Diamond Oil NT-68 (Jig Ref. No. J-13) to ☆ marked portion.
- Keep clean the felt side of TG1 assembly.

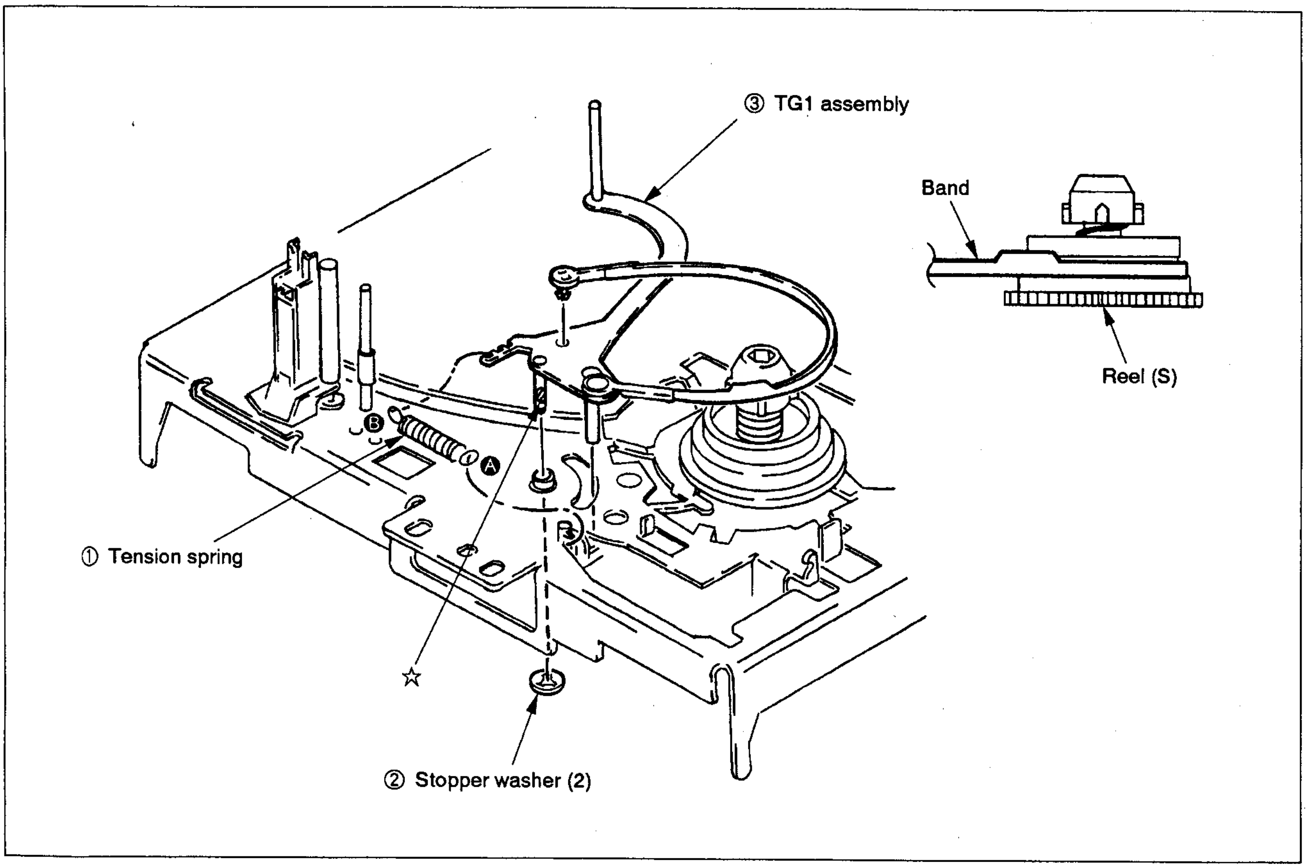

③ TG1 assembly
Band
Reel (S)
Ⓑ
Ⓐ
① Tension spring
☆
② Stopper washer (2)

Fig. 3-24

3-23. S WINDING BLOCK ASSEMBLY (Fig. 3-25)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-18.)
5) Remove stopper washer (2) ① to pull out S winding block assembly ②.
6) Remove torsion spring ③.

[Note on Mounting]

- At the last, hang torsion spring ② to the position Ⓐ.
- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions.

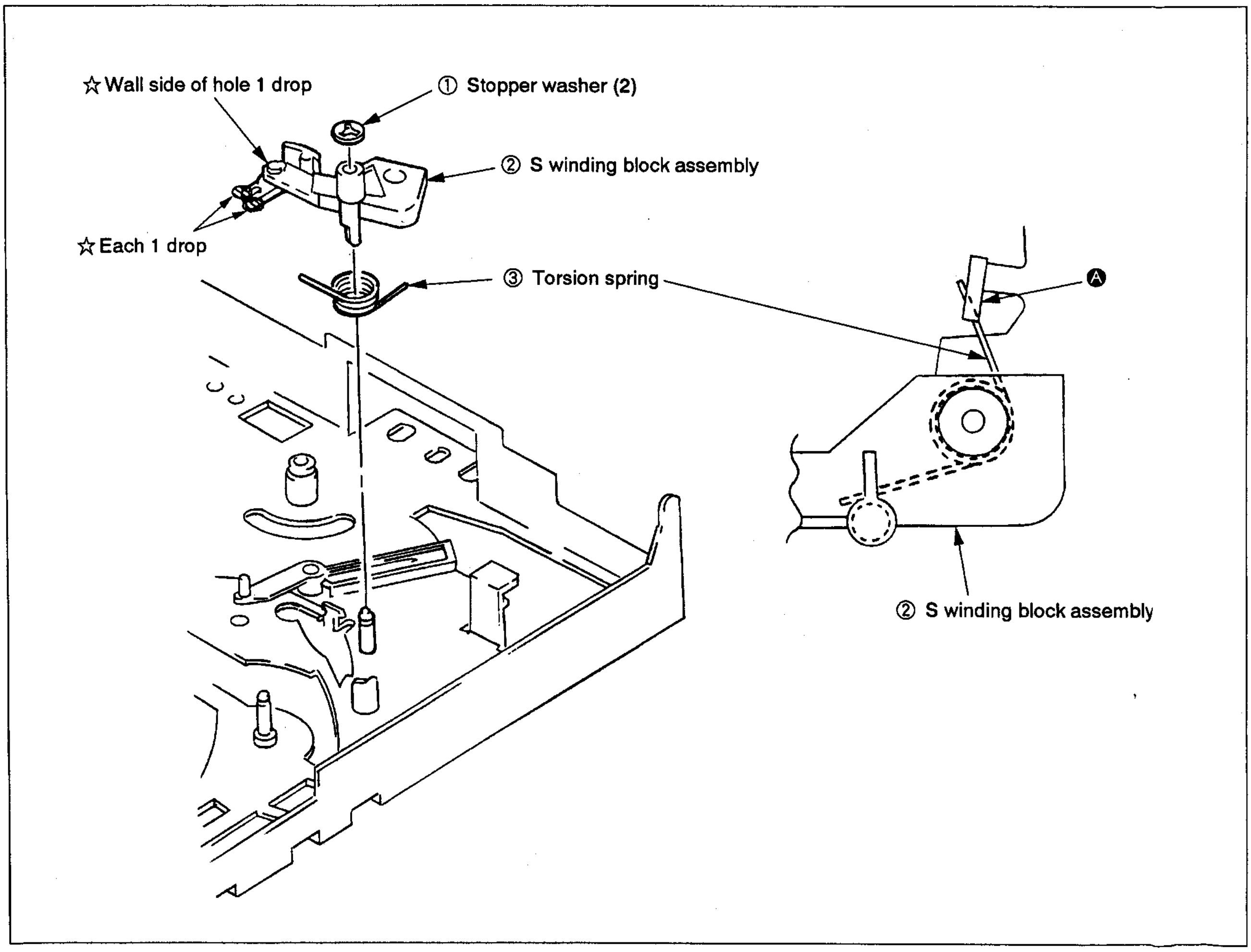

☆Wall side of hole 1 drop
① Stopper washer (2)
② S winding block assembly
☆Each 1 drop
③ Torsion spring
Ⓐ
② S winding block assembly

Fig. 3-25

3-24. TRIGGER LEVER AND RKB BLOCK ASSEMBLIES (Fig. 3-26)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-18.)
5) Remove tension spring ① in the order Ⓐ to Ⓑ to remove trigger lever assembly ②.
6) Remove screws (3 × 8) ③ to remove RKB block assembly ④.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions on trigger lever assembly. (Fig. A)

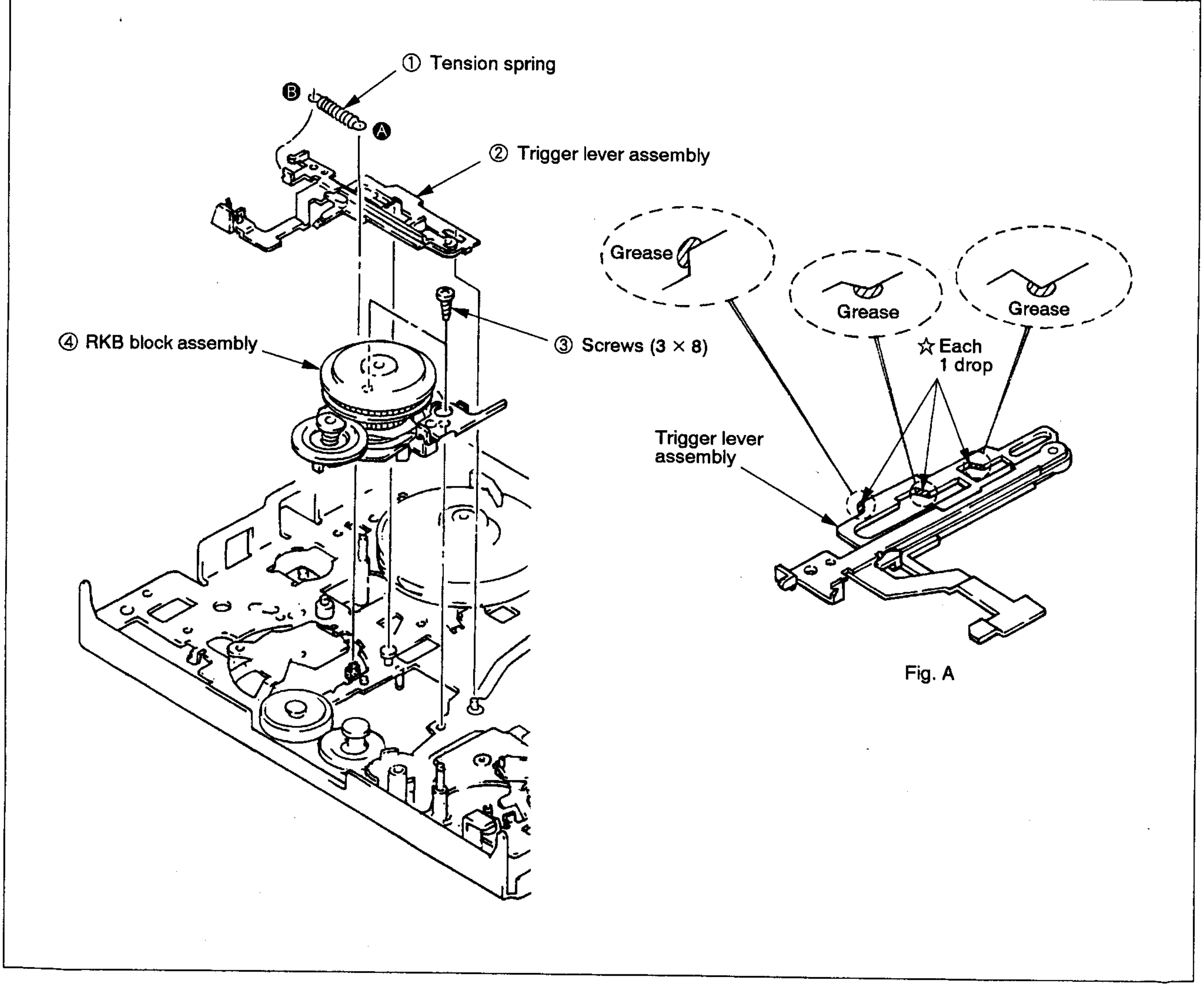

① Tension spring
Ⓑ
Ⓐ
② Trigger lever assembly
④ RKB block assembly
③ Screws (3 × 8)
Grease
Grease
Grease
☆ Each 1 drop
Trigger lever assembly

Fig. A

Fig. 3-26

4. ADJUSTMENT

4-1. TAPE PATH ADJUSTMENT

The "Tape path" refers to the route of the tape from the supply reel disk to the take-up reel disc via the video heads.

Each component part of the tape transport system particularly the surface of parts which make direct contact with the tape must always be kept clean, free of dust, oil, scratches and so forth.

The tape path system is factory preadjusted, when parts of the tape transport system are replaced, be sure to make the required adjustments as precisely as possible in order to ensure stable tape transport.

4-1-1. TENSION REGULATOR (TG1) POSITION/ TENSION ADJUSTMENT (Fig. 4-1)

Purpose: stabilizes contact of the video head and the tape to maintain the tension of the tape so that it feeds at a constant level.

• Position adjustment

Mode	Treading is completed without a cassette loaded
Adjustment locations	Eccentric pin of TG1 band assembly

[Adjustment Method]

1) Allow the unit to go through the threading procedure without a cassette loaded.
2) Set the unit to play back, then turn the eccentric pin so that the tip of tension arm goes to the left side line carved on the mechanical chassis. (Fig. A)
3) After adjustment, go through the loading procedure once more without a cassette loaded, then check the position of the tension arm.

• Tension adjustment

Mode	Playback
Measuring instrument/tool	Torque cassete
Adjustment locations	Position for hooking the tension spring
Specified value	36 to 44 g•cm

[Adjustment Method]

1) Playback the torque cassette.
2) Check that the center value deviation reading on the torque cassette meets with the standards.
3) When the reading is higher than the standards: Move the spring toward direction Ⓐ.
   When the reading is less than the standards: Move the spring toward direction Ⓑ.

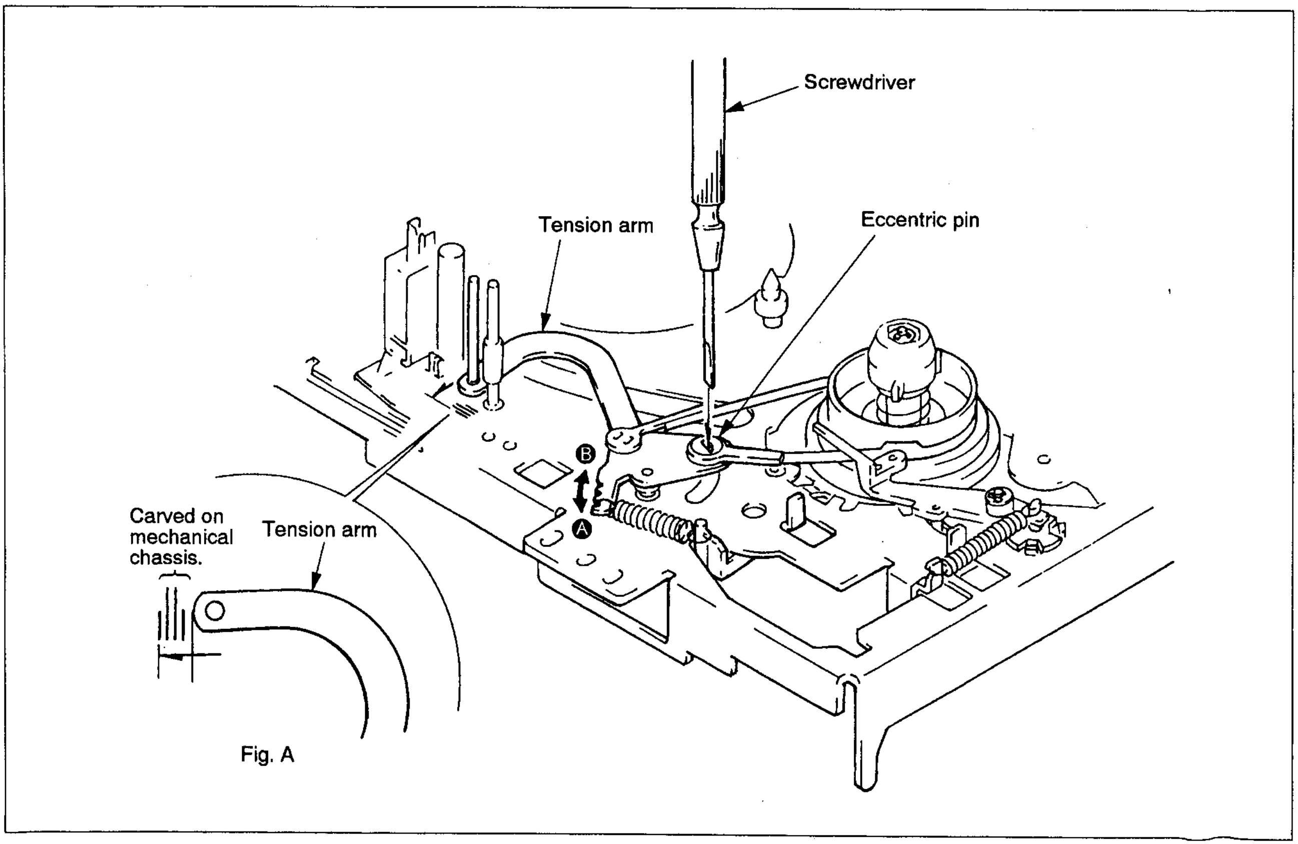


Fig. 4-1

4-1-2. TG8 GUIDE ROLLER HEIGHT ADJUSTMENT (Fig. 4-2)

Mode	Playback
Jig	Blank tape
Adjustment locations	Guide roller height adjustment screw
Specified value	0 to 0.1 mm

Procedure:

1) Set the tape, during CUE playing back, check the height from lower flange of TG7 to the running tape. (Fig. A)
2) During REV playing back, check the height from lower flange of TG7 to the running tape. (Fig. B)
3) When the difference between items 1) and 2) doesn't go to specified value, adjust by turning TG8 guide roller height adjustment screw.
4) Check the tape is creased or not between the capstan and TG8, adjust with TG8 guide roller height adjustment screw so that the tape is not creased during normal playback, CUE and REV.

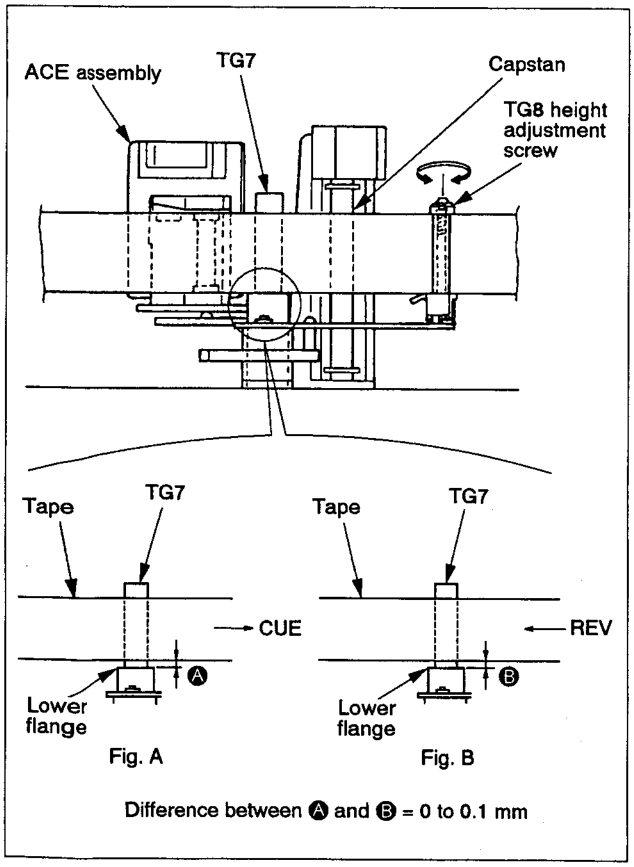


Fig. A

Fig. B

Difference between Ⓐ and Ⓑ = 0 to 0.1 mm

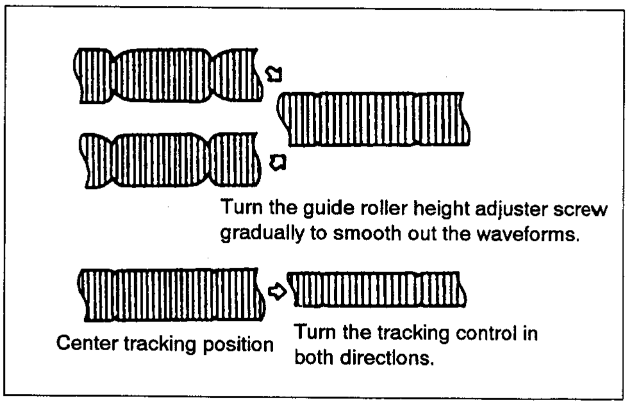
Fig. 4-2

4-1-3. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6 (Fig. 4-3)

Mode	Playback
Signal	Alignment tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SW P pin for RF PC board check.
Adjustment locations	Guide roller height adjuster screw

[Adjustment Method]

1) Tracking (playback): Turn off the auto tracking, then press the tracking buttons ▽ and △ simultaneously to set the tracking at the center position.
(If adjustment is made after the drum is replaced, the tracking must be set at the max. RF output position.)
2) Height adjuster screw: Even out the RF output waveforms.
3) Press the tracking buttons (playback), ▽ and △ alternately.
4) Check that RF output drops the same amount at the front and rear edges.



Turn the guide roller height adjuster screw gradually to smooth out the waveforms.

Center tracking position

Turn the tracking control in both directions.

Fig. 4-3

4-1-4. ACE HEAD ASSEMBLY ADJUSTMENT (ROUGH ADJUSTMENT) (Figs. 4-4 and 4-5)

Purpose: Allows the tape to make even contact with the head for recording and playback of the specified track.

Mode	Playback
Tool	Blank tape
Adjustment locations	Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Mount the ACE head assembly. At this time, adjust the height so that the height of guide flange No. 7 matches the level of the lower edge of the control head.
2) Remove the adjustment tool and load a new tape, then set the unit for playback.
3) Check that the tape does not curl or rise up noticeably near the ACE head.
4) If the tape curls up or rises noticeably, readjust the tilt adjuster screw, the azimuth adjuster screw and the height adjuster nut.
   (The height of the ACE head should be adjusted so that the lower edge of the tape is approx. 0.1 to 0.15 mm from the control head.)
5) Perform precision adjustment.

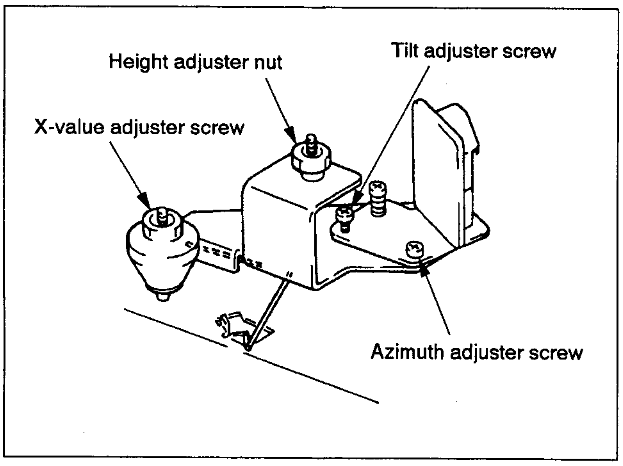

Height adjuster nut
Tilt adjuster screw
X-value adjuster screw
Azimuth adjuster screw

Fig. 4-4

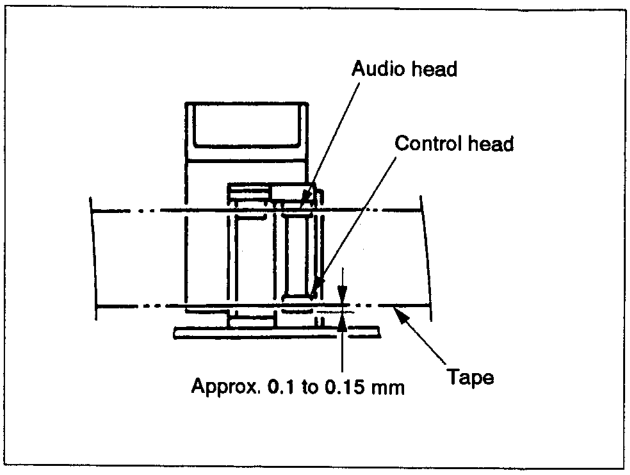

Audio head
Control head
Approx. 0.1 to 0.15 mm
Tape

Fig. 4-5

4-1-5. ACE HEAD ASSEMBLY ADJUSTMENT (PRECISION ADJUSTMENT)

Mode	Playback
Signal	Alignment tape (1kHz track)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Adjust the tilt adjuster screw in the FWD or REV mode so that the lower flange of guide No. 7 does not curl up or rise.
2) Alternately adjust the azimuth adjuster screw, the height adjuster nut, and the tilt adjuster screw to maintain even audio output at maximum with minimum deviation.

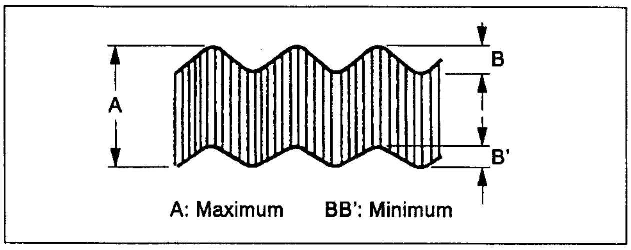

A
B
B'
A: Maximum
BB': Minimum

Fig. 4-6

4-1-6. X-VALUE ADJUSTMENT

Purpose: To obtain compatibility with other VTR

Precaution: Be sure to perform the preset tracking adjustment before perform this adjustment. (Refer to the Service Guide.)
Turn off the auto tracking and set the VTR for manual tracking mode.

Mode	Playback
Signal	Alignment tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SW P pin for RF PC board check.
Adjustment locations	X-value adjuster screw

[Adjustment Method]

- **Adjustment by HI-FI alignment tape (NTSC only)**
  When the tracking is set at the center position (by pressing the ▽ and △ keys simultaneously), adjust the RF output to maximum.

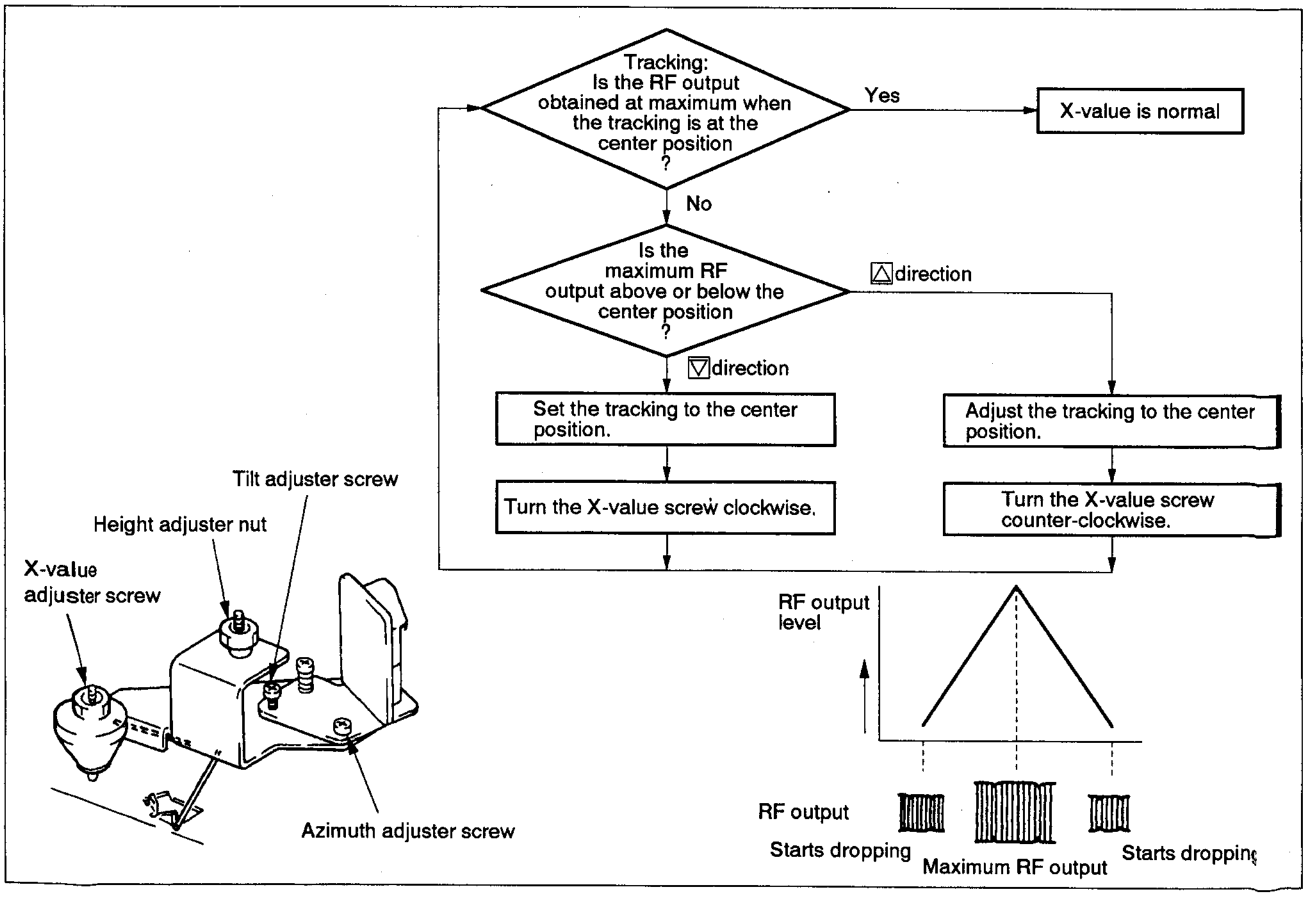

Tracking:
Is the RF output obtained at maximum when the tracking is at the center position ?
Yes
X-value is normal
No
Is the maximum RF output above or below the center position ?
△direction
▽direction
Set the tracking to the center position.
Turn the X-value screw clockwise.
Adjust the tracking to the center position.
Turn the X-value screw counter-clockwise.
Tilt adjuster screw
Height adjuster nut
X-value adjuster screw
Azimuth adjuster screw
RF output level
RF output
Starts dropping
Maximum RF output
Starts dropping

Fig. 4-7

- **Adjustment by alignment tape**

  Adjust the X-value adjuster screw so that maximum RF output is obtained and also that the RF output drops to the same position on pressing the respective ▽ and △ buttons while the tracking is set at the center position.

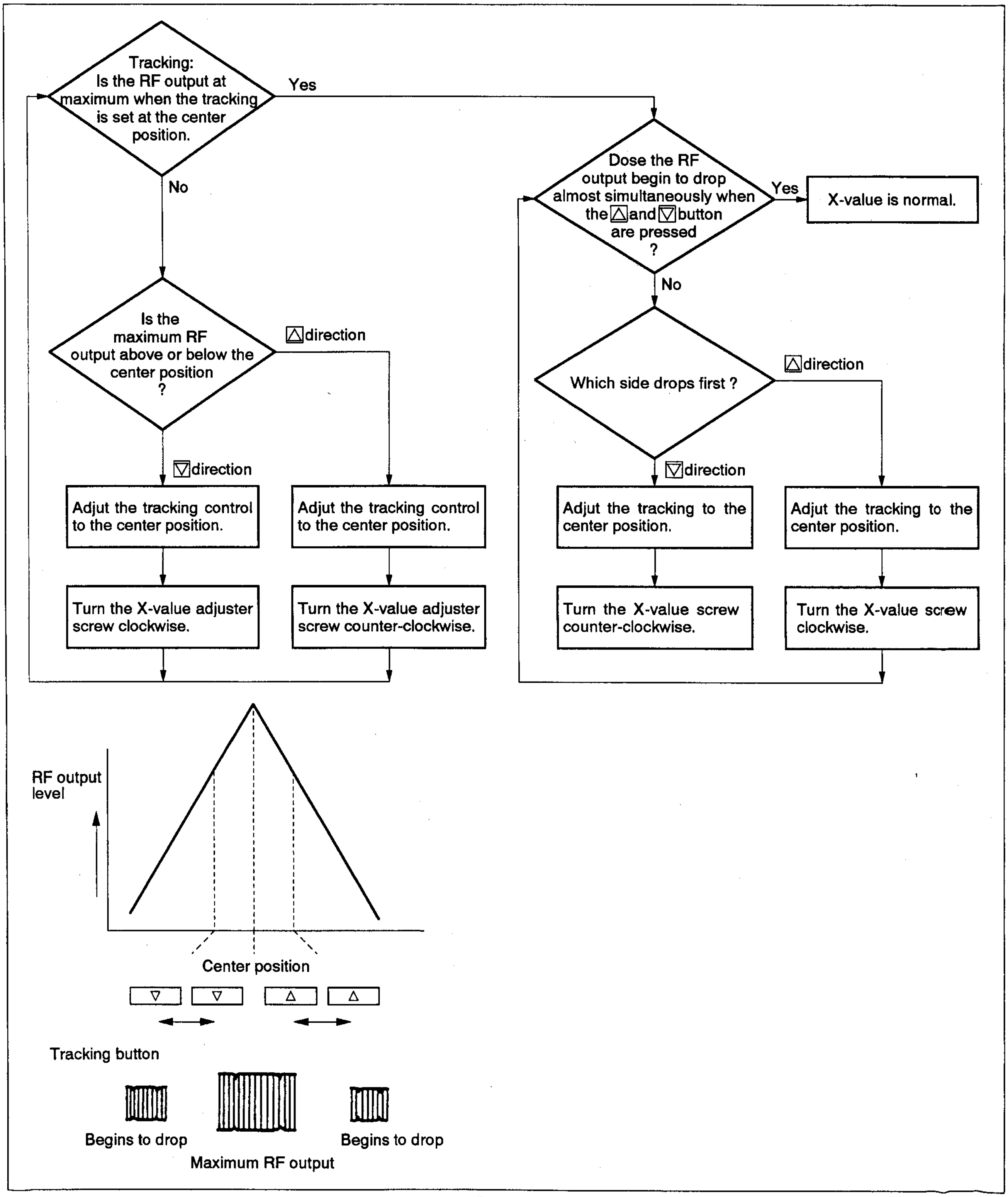

Tracking: Is the RF output at maximum when the tracking is set at the center position.
Yes
No
Is the maximum RF output above or below the center position ?
△direction
▽direction
Adjut the tracking control to the center position.
Adjut the tracking control to the center position.
Turn the X-value adjuster screw clockwise.
Turn the X-value adjuster screw counter-clockwise.
Dose the RF output begin to drop almost simultaneously when the △and▽button are pressed ?
Yes
X-value is normal.
No
Which side drops first ?
△direction
▽direction
Adjut the tracking to the center position.
Adjut the tracking to the center position.
Turn the X-value screw counter-clockwise.
Turn the X-value screw clockwise.
RF output level
Center position
▽
▽
△
△
Tracking button
Begins to drop
Maximum RF output
Begins to drop

Fig. 4-8

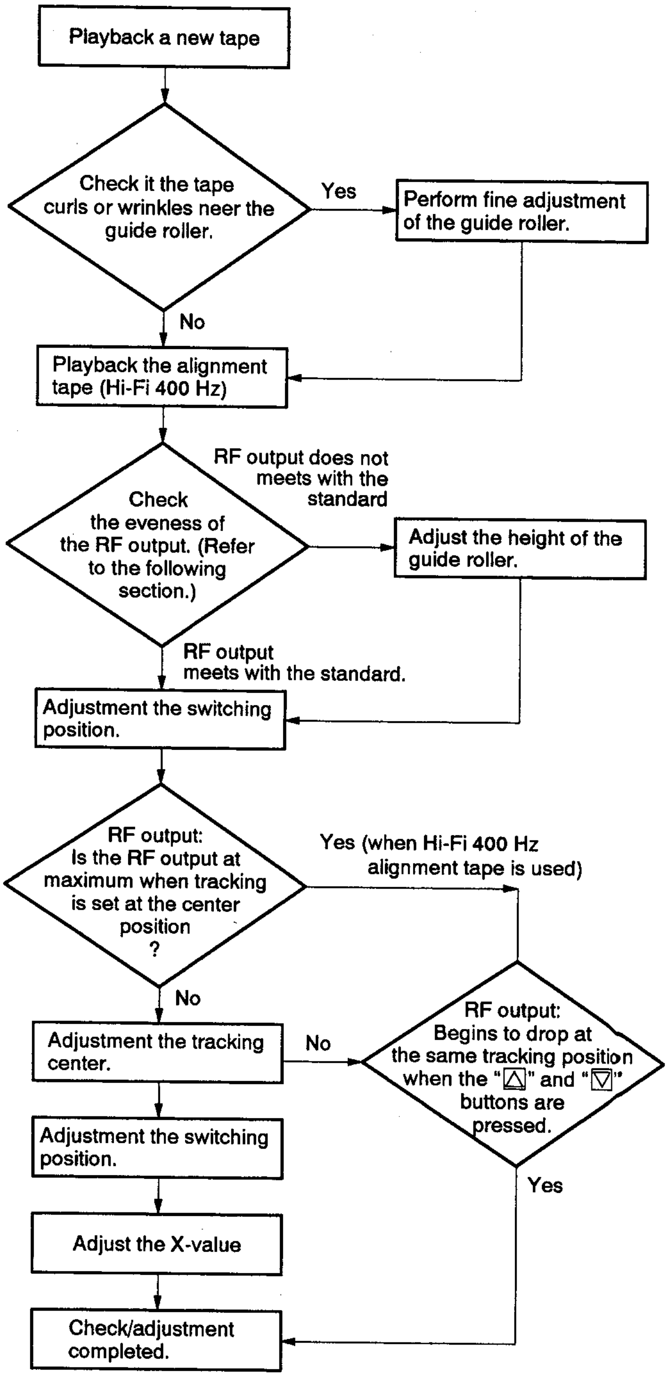
4-1-7. ADJUSTMENTS AFTER REPLACING THE DRUM (VIDEO HEAD)

Purpose: Co-relative height, X-value and other factors of the drum will deviate from those of the guide roller. If the drum is replaced properly, these deviations are extremely small.

Precaution: Turn off the auto tracking and set the manual tracking mode.

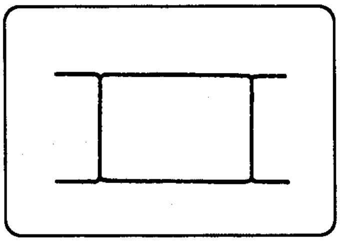
Mode	Playback
Signal	Alignment tape, blank tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SW P pin for RF PC board check.
Adjustment locations	Guide roller (refer to 4-1-2, 4-1-3.) Switching position, Tracking preset, SP delay mono-multi (Refer to the Service Manual), X-value. (refer to 4-1-6.)

[Adjustment Method]

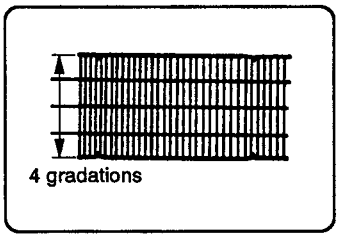

Playback a new tape
Check it the tape curls or wrinkles neer the guide roller.
Yes
Perform fine adjustment of the guide roller.
No
Playback the alignment tape (Hi-Fi 400 Hz)
Check the eveness of the RF output. (Refer to the following section.)
RF output does not meets with the standard
Adjust the height of the guide roller.
RF output meets with the standard.
Adjustment the switching position.
RF output: Is the RF output at maximum when tracking is set at the center position ?
Yes (when Hi-Fi 400 Hz alignment tape is used)
No
Adjustment the tracking center.
No
RF output: Begins to drop at the same tracking position when the "△" and "▽" buttons are pressed.
Yes
Adjustment the switching position.
Adjust the X-value
Check/adjustment completed.

[Checking the evenness and fluctuation of the RF output]

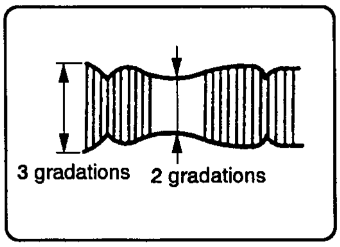
1) Set the RF output to the maximum level using the tracking buttons.



2) Perform fine adjustment of the voltage level range of the oscilloscope, then adjust the RF output deviation to within 4 gradations.



3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 3 gradations.
4) At this time, check if the minimum amplitude is more than 2 gradations.



5) Check that the RF output fluctuation between minimum and maximum levels is within 13%.

4-1-8. CHECKING THE TENSION AND TORQUE

Purpose: To check that the tension, torque and compression force of the tape take-up section and mobile sections to ensure smooth tape run and achieve standard VTR performance.

If the tape transport is not smooth or problems occur in relation to the tape transport speed, perform the following check.

Mode	Each operation mode without loading a cassette tape. (Refer to section 1-3.)
Measuring instrument	Torque gauge, Torque gauge adaptor

Item	VTR operation mode	Reel to be measured	Measurement value
Main brake torque	Stop	Supply and take-up reels	170 g•cm or more
Review torque	Review	Supply reel	180 ± 30 g•cm (using the torque cassette)
Take-up torque	Playback	Take-up reel	95 ± 25 g•cm (using the torque cassette)
Back tension torque	Playback	Take-up reel	33 to 44 g•cm (using the torque cassette)

[Check Method]

Measure the torque using the torque gauge and torque gauge adaptor with the torque gauge fixed.

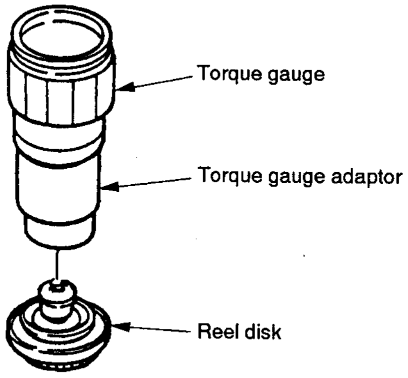


Fig. 4-9

VHS MECHANICAL ADJUSTMENT MANUAL IV

9-973-623-11

Sony Corporation
Consumer A&V Products Company
Home A&V Products Div.

Published by Personal A&V Products Div.
Quality Engineering Dept.

VHS MECHANICAL ADJUSTMENT MANUAL IV

SONY®
SERVICE MANUAL

H MECHANISM

SUPPLEMENT-1

1. How to Use the Mode Selector II for Adjusting H Type Mechanism Assembly.
2. Adjusting Mechanism Using New Alignment Tape (KRV-52NE For NTSC).

File this supplement with the VHS mechanical adjustment IV.

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MICROFILM

1. HOW TO USE THE MODE SELECTOR Ⅱ FOR ADJUSTING H TYPE MECHANISM ASSEMBLY

1-1. OUTLINE

To activate the VHS system H type mechanism assembly using mode selector Ⅱ (J-6082-282-A), use connector conversion jig (J-6090-052-A). By using the connector conversion jig, the following operations are possible.

- Loading and unloading action by the loading motor
- Reading of the current setting of the mode switch
- Normal and reverse rotation of the capstan motor

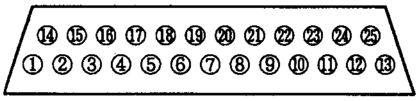
1-2. PREPARATION

1-2-1. ADDITION OF POWER SUPPLY CABLE (Already added Mode Selector Ⅱ also available)

In order to drive the capstan motor, the power +5 V and +12 V are supplied from the Mode Selector Ⅱ. Disassemble the D-SUB connector of the Mode Selector cable, then solder the following three places.

Supplied 3-pin cable	DSUB connector of the mode selector Ⅱ	Voltage
Pin 1 (Red index)	Pin 20	+12 V
Pin 2	Pin 25	GND
Pin 3	Pin 24	+5 V

- Connector pin number assignment of the DSUB connector (From the soldering side)



- When connections are made, check that +5 V and +12 V are available at the 3-pin cable connector.

1-2-2. CHECKING THE SOFTWARE VERSION

Turn on the power of the mode selector II.

If the reading for the software version on the mode selector II is not 1.10 or higher, replace the New ROM (J-6082-314-A).

1-3. CONNECTION

1-3-1. CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE MODE SELECTOR Ⅱ (See Fig. 1-1)

Insert the connectors of the two 6-pin cables (one is white and the other is black) and the 3-pin cable from the mode selector Ⅱ to the corresponding connectors on the connector conversion jig (J-6090-052-A).

1-3-2. CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE H TYPE MECHANISM ASSEMBLY

With the power of the mode selector Ⅱ turned off, insert the following three connectors to the corresponding connectors on the H type mechanism assembly.

- 3-pin connector for the loading motor
- 5-pin connector for the mode switch
- 8-pin connector for the capstan motor

Set the speed control for the minimum setting (fully counterclockwise).

1-4. OPERATION

1-4-1. OPERATION OF THE LOADING MOTOR ON THE H TYPE MECHANISM ASSEMBLY

(1) Select the H type mechanism assembly setting on the mode selector Ⅱ .

(2) After this, procedures are the same as those for the previous model types.
For the operating method, see pages 3 to 5 of "8 mm Video Mechanism Manual Ⅵ (TK Mechanism) Supplement-1".
For the loading method, see page 3 of "VHS Mechanical Adjustment Manual Ⅳ (H Mechanism)".

1-4-2. OPERATION OF THE CAPSTAN MOTOR ON THE H TYPE MECHANISM ASSEMBLY

(1) For the loading motor operation under Section 1-4-1, change the mode setting to the FF/REW mode with the mode switch.

(2) Turn the speed control gradually in clockwise direction, and the capstan motor starts rotating. To turn the capstan motor in desired rotating direction, change the FWD/RVS setting of the rotating direction switch.

1-5. PRECAUTIONS

- Turn the speed control only when necessary. Otherwise, hold the speed control turned at fully counterclockwise direction. If the power of the mode selector II is turned on with the speed control turned in clockwise direction, +12V power fails and the power of the mode selector II cannot be turned on.
- Although the connector conversion jig (J-6090-052-A) has rubber feet, do not make a short circuit on the bottom surface of the connector conversion jig via foreign conductive materials.

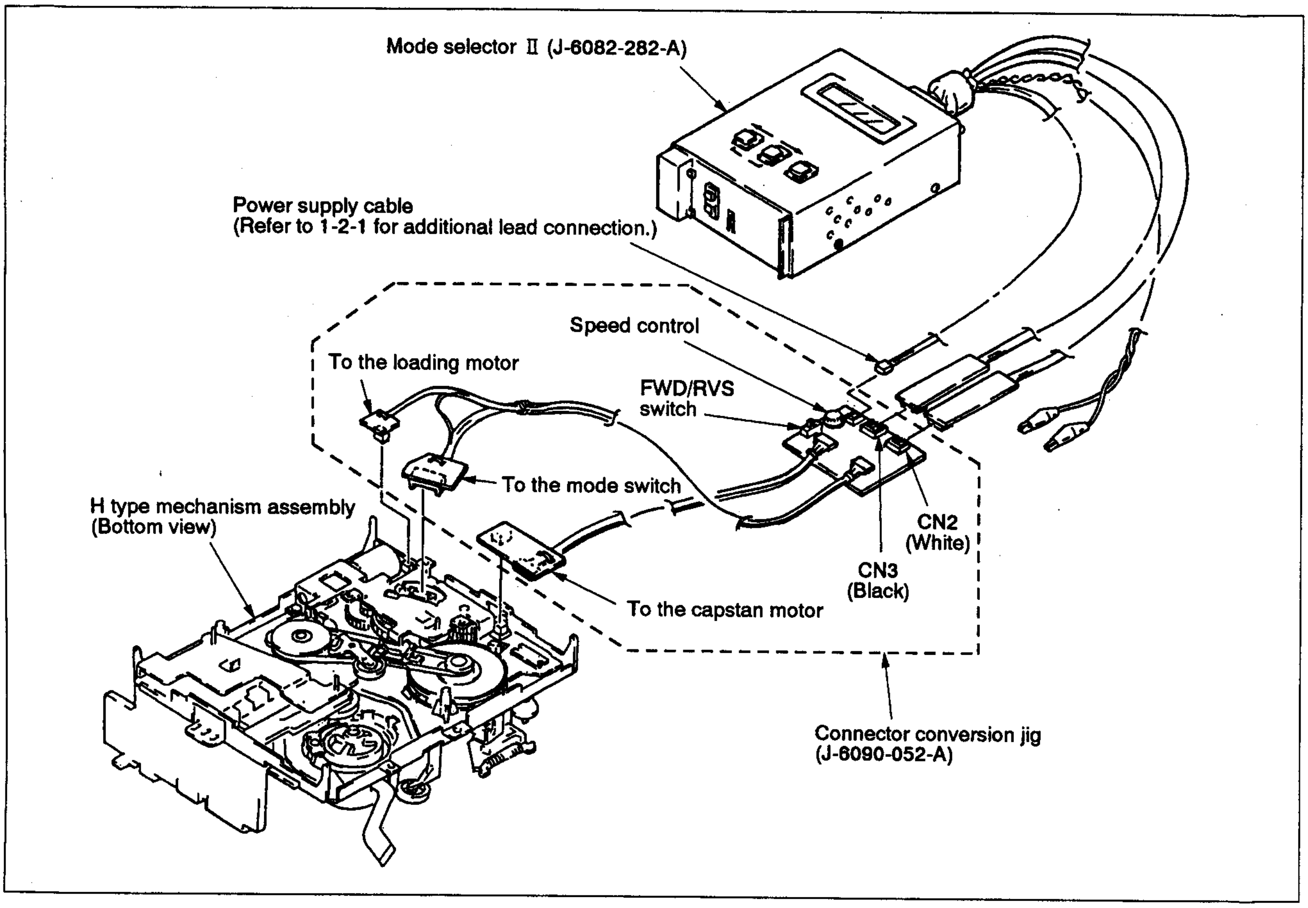

Mode selector Ⅱ (J-6082-282-A)
Power supply cable
(Refer to 1-2-1 for additional lead connection.)
Speed control
To the loading motor
FWD/RVS switch
To the mode switch
H type mechanism assembly
(Bottom view)
CN2
(White)
CN3
(Black)
To the capstan motor
Connector conversion jig
(J-6090-052-A)

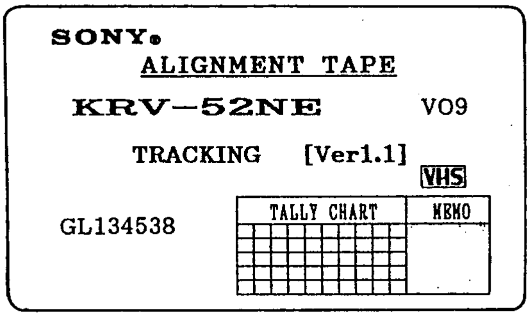
Fig. 1-1

2. ADJUSTING THE MECHANISM USING NEW ALIGNMENT TAPE (KRV-52NE for NTSC)

The conventional alignment tape (For NTSC) is now replaced with alignment tape KRV-52NE, and the following describes how to align the mechanism using the KRV-52NE. For details on the use of KRV-51N2 for each model, refer to the service manuals which will be issued in the future.

Name	Parts No.	Remarks
Alignment tape KRV-52NE for NTSC	8-192-605-41	For tape path, audio azimuth, and X-value adjustments
Alignment tape KRV-51N2 for NTSC	8-192-605-32	For electrical adjustments (RF, AF, and switching position) and operation check

Note: The KRV-52NE has or does not have Ver No. depending on new or old type as shown below. (New one has Ver No.)
Note that an adjusting method of X-value is different.



SONY®
ALIGNMENT TAPE
KRV–52NE V09
TRACKING [Ver1.1]
VHS
GL134538

TALLY CHART	MEMO

Contents:
KRV-52NE (NTSC)

Time	Video	Audio
20 min.	Recording only at 1 MHz, A-ch. EP mode RF skipping once per 5 frames	5 kHz full tracks

KRV-51N2 (NTSC)

Class	Mode	Time	Video	Audio (HIFI/Normal)
1	SP	7 min.	Color bar	400 Hz
2	SP	3 min.	Mono. scope	400 Hz
3	EP	7 min.	Color bar	400 Hz
4	EP	3 min.	Mono. scope	400 Hz

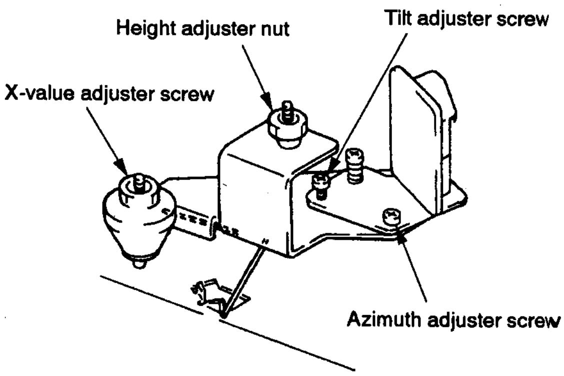
2-1. ADJUSTMENT USING ALIGNMENT TAPE (KRV-52NE for NTSC having no version No.)

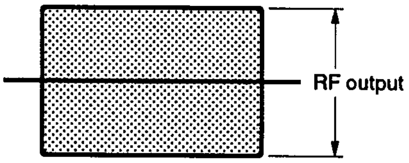
2-1-1. X-VALUE ADJUSTMENT (Using the tape having no version No.)

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC having no version No.)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	X-value adjuster screw

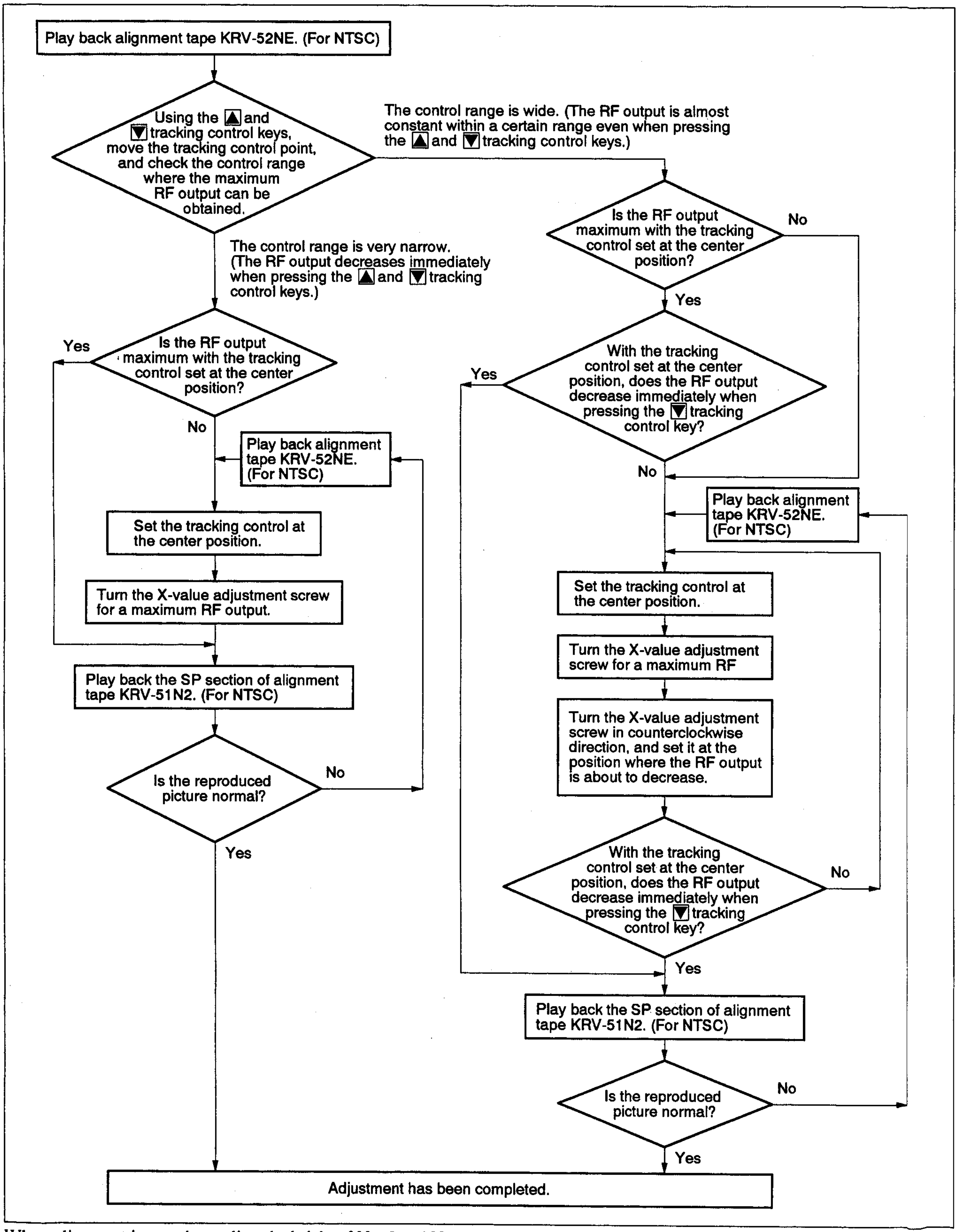




RF output shall be maximum at the center position of the tracking control.

[Adjustment Method]
Set the tracking control at the center position. For the VCRs equipped with narrow gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

X-VALUE ADJUSTMENT (Using the tape having no version No.)


Play back alignment tape KRV-52NE. (For NTSC)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Play back alignment tape KRV-52NE. (For NTSC)
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF output.
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
No
Yes
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Play back alignment tape KRV-52NE. (For NTSC)
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Turn the X-value adjustment screw in counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
No
Yes
Adjustment has been completed.

When adjustment is complete, adjust the height of No. 3 and No. 6 guide rollers on page 10.

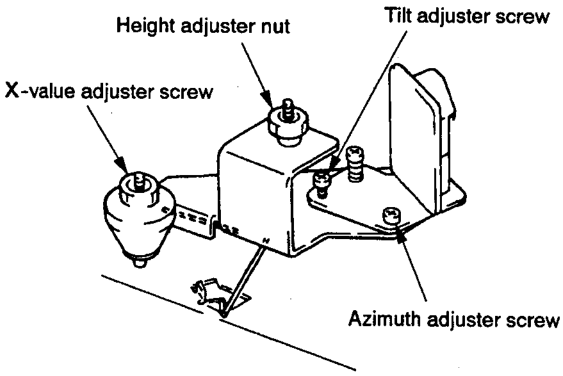
2-2. ADJUSTMENT USING ALIGNMENT TAPE (KRV-52NE for NTSC having the version No.)

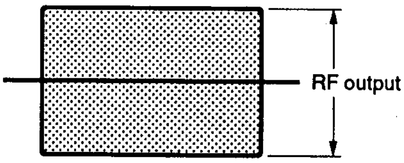
2-2-1. X-VALUE ADJUSTMENT (Using the tape having the version No.)

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC having the version No.)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	X-value adjuster screw



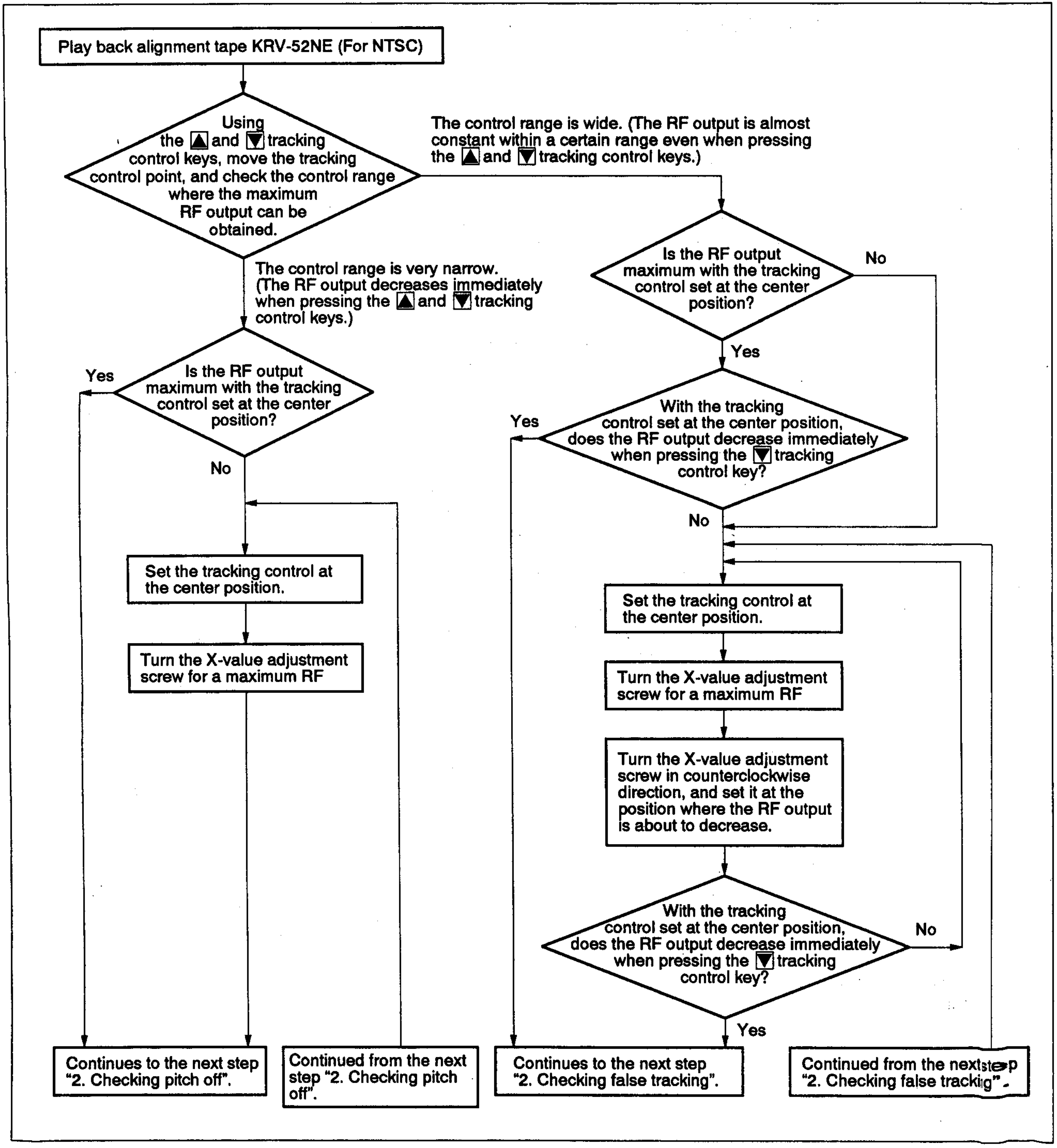


RF output shall be maximum at the center position of the tracking control.

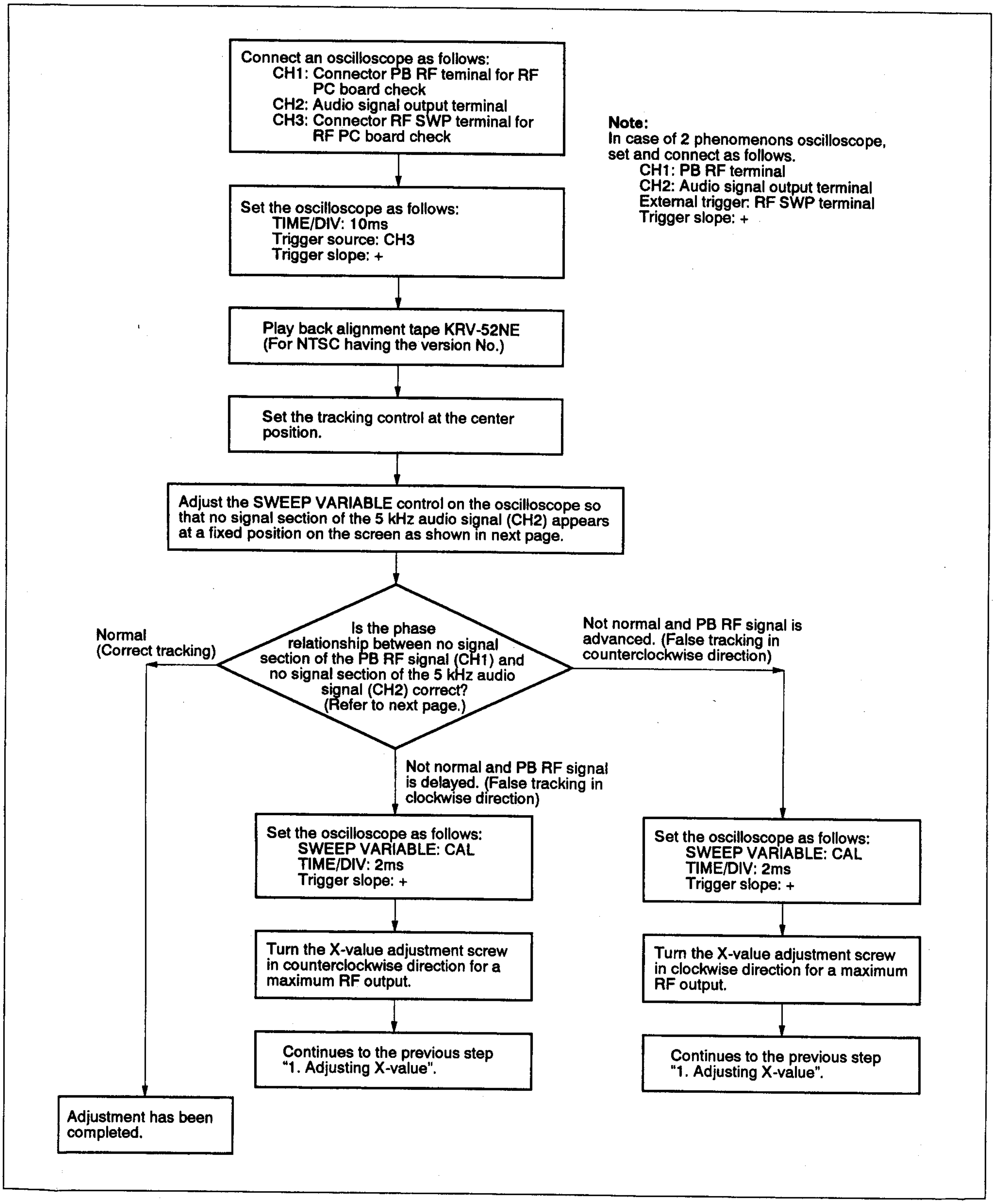
[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with narrow gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

1. Adjusting X-value (Using the tape having the version No.)


Play back alignment tape KRV-52NE (For NTSC)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Turn the X-value adjustment screw in counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Continues to the next step "2. Checking pitch off".
Continued from the next step "2. Checking pitch off".
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

2. Checking false tracking (Using the tape having the version No.)



Connect an oscilloscope as follows:
CH1: Connector PB RF teminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check

Note:
In case of 2 phenomenons oscilloscope, set and connect as follows.
CH1: PB RF terminal
CH2: Audio signal output terminal
External trigger: RF SWP terminal
Trigger slope: +

Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source: CH3
Trigger slope: +

Play back alignment tape KRV-52NE (For NTSC having the version No.)

Set the tracking control at the center position.

Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 5 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.

Is the phase relationship between no signal section of the PB RF signal (CH1) and no signal section of the 5 kHz audio signal (CH2) correct? (Refer to next page.)

Normal (Correct tracking)

Adjustment has been completed.

Not normal and PB RF signal is delayed. (False tracking in clockwise direction)

Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +

Turn the X-value adjustment screw in counterclockwise direction for a maximum RF output.

Continues to the previous step "1. Adjusting X-value".

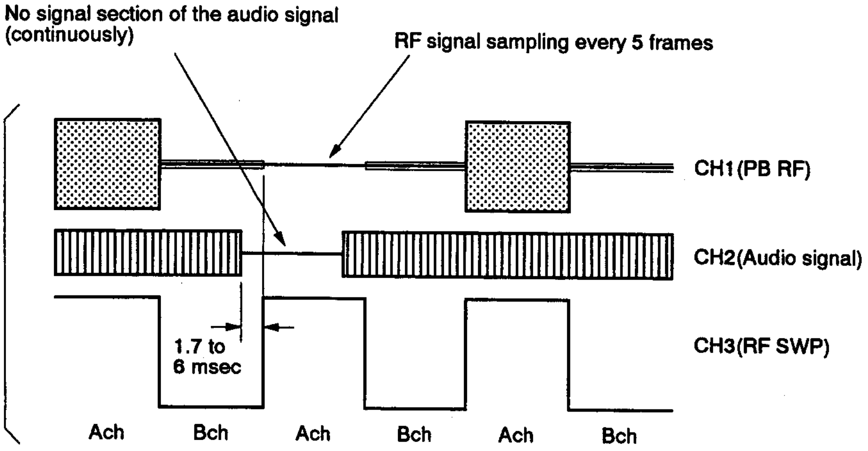
Not normal and PB RF signal is advanced. (False tracking in counterclockwise direction)

Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +

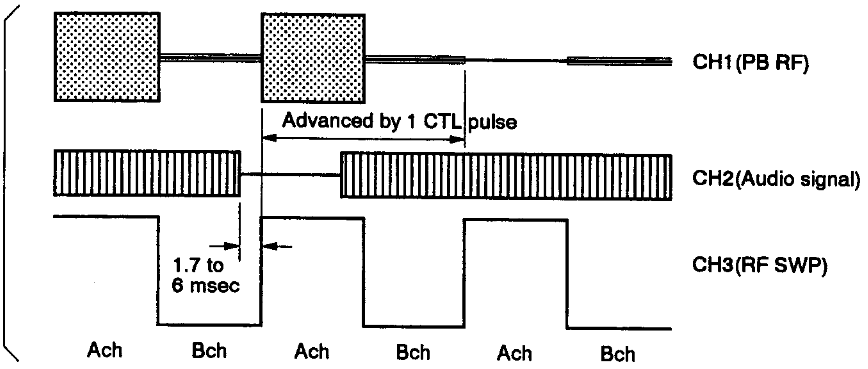
Turn the X-value adjustment screw in clockwise direction for a maximum RF output.

Continues to the previous step "1. Adjusting X-value".

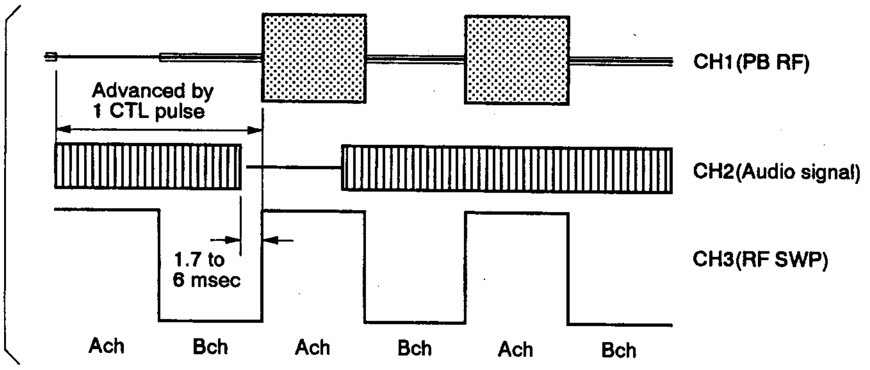
Using the tape having the version No.


No signal section of the audio signal (continuously)
RF signal sampling every 5 frames
CH1 (PB RF)
CH2 (Audio signal)
CH3 (RF SWP)
1.7 to 6 msec
Ach
Bch
Ach
Bch
Ach
Bch

Normal tracking


CH1 (PB RF)
Advanced by 1 CTL pulse
CH2 (Audio signal)
CH3 (RF SWP)
1.7 to 6 msec
Ach
Bch
Ach
Bch
Ach
Bch

False tracking delayed by 1 CTL pulse (in clockwise direction)


CH1 (PB RF)
Advanced by 1 CTL pulse
CH2 (Audio signal)
CH3 (RF SWP)
1.7 to 6 msec
Ach
Bch
Ach
Bch
Ach
Bch

False tracking advanced by 1 CTL pulse (in counterclockwise direction)

2-3. ADJUSTING THE MECHANISM USING ALIGNMENT TAPE (KRV-52NE for NTSC)

2-3-1. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6

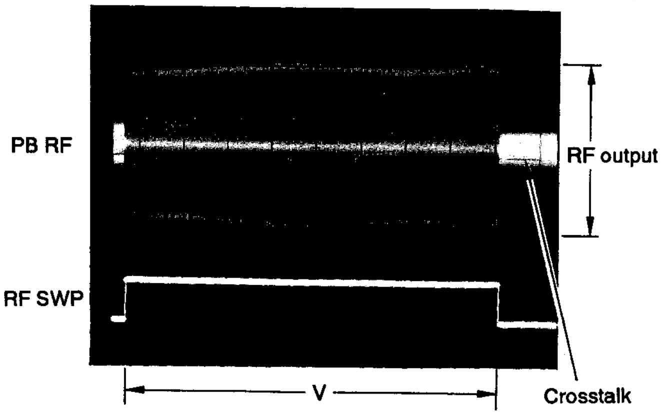
Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	Height adjustment screw for No.3 tape guide roller Height adjustment screw for No.6 tape guide roller

[Adjustment Method]

The following adjustment shall be carried out after completed Section 2-1-1 "X-value adjustment and check".

1) Deactivate the automatic tracking control, and set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

2) Check if the RF output changes in amplitude by pressing the tracking control key. The RF output should change periodically (changes from a minimum amplitude to a maximum amplitude, and to the minimum amplitude again).

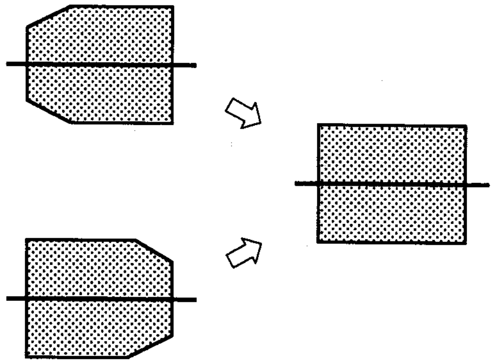


3) Turn the height adjustment screws of tape guide rollers No.3 and No.6 so that the RF output envelope becomes as flat as possible.

4) Press the ▲ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.

5) Press the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.

Turn the height adjustment screws of tape guide rollers No.3 and No.6 little by little so that the RF output envelope becomes as flat as possible.

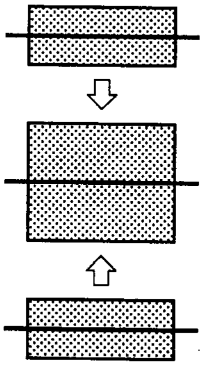


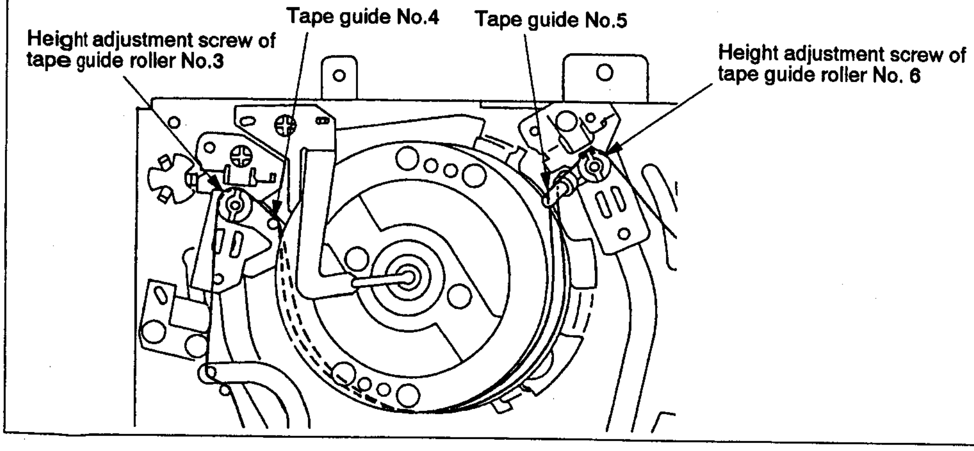
Press the ▼ tracking control key, then the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.

When the ▲ tracking control key is pressed.

At the tracking center position.

When the ▼ tracking control key is pressed.




Tape guide No.4
Tape guide No.5
Height adjustment screw of tape guide roller No.3
Height adjustment screw of tape guide roller No. 6

2-3-2. ACE HEAD ASSEMBLY ADJUSTMENT (ROUGH ADJUSTMENT) (Figs. 2-1 and 2-2)

Purpose: Allows the tape to make even contact with the head for recording and playback of the specified track.

Mode	Playback
Jig	Blank tape
Adjustment locations	Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Mount the ACE head assembly. At this time, adjust the height so that the height of guide flange No. 7 matches the level of the lower edge of the control head.
2) Remove the adjustment tool and load a new tape, then set the unit for playback.
3) Check that the tape does not curl or rise up noticeably near the ACE head.
4) If the tape curls up or rises noticeably, readjust the tilt adjuster screw and the height adjuster nut.
   (The height of the ACE head should be adjusted so that the lower edge of the tape is approx. 0.1 to 0.15 mm from the control head.)
5) Perform precision adjustment.

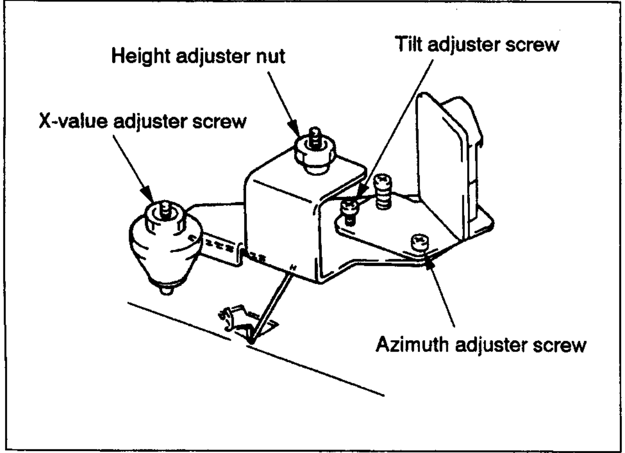


Fig. 2-1

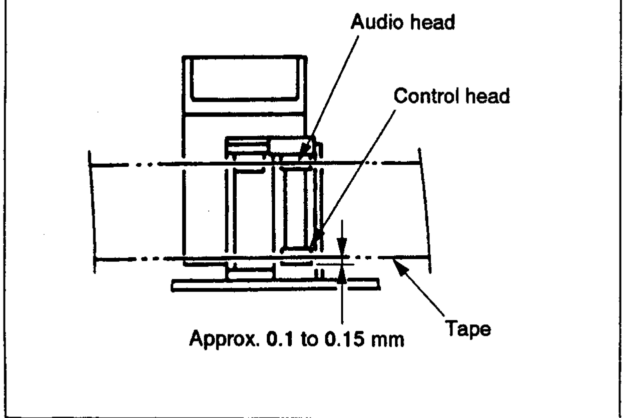


Fig. 2-2

2-3-3. ACE HEAD ASSEMBLY ADJUSTMENT (PRECISION ADJUSTMENT)

Mode	Playback
Signal	Alignment tape (KRV-52NE 5 kHz) (For NTSC)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Adjust the tilt adjuster screw in the FWD or REV mode so that the lower flange of guide No. 7 does not curl up or rise.
2) Alternately adjust the azimuth adjuster screw, the height adjuster nut, and the tilt adjuster screw to maintain even audio output at maximum with minimum deviation.

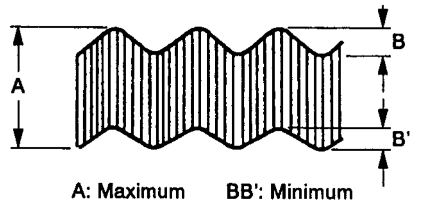


Fig. 2-3

2-3-4. ADJUSTMENTS AFTER REPLACING THE DRUM (VIDEO HEAD)

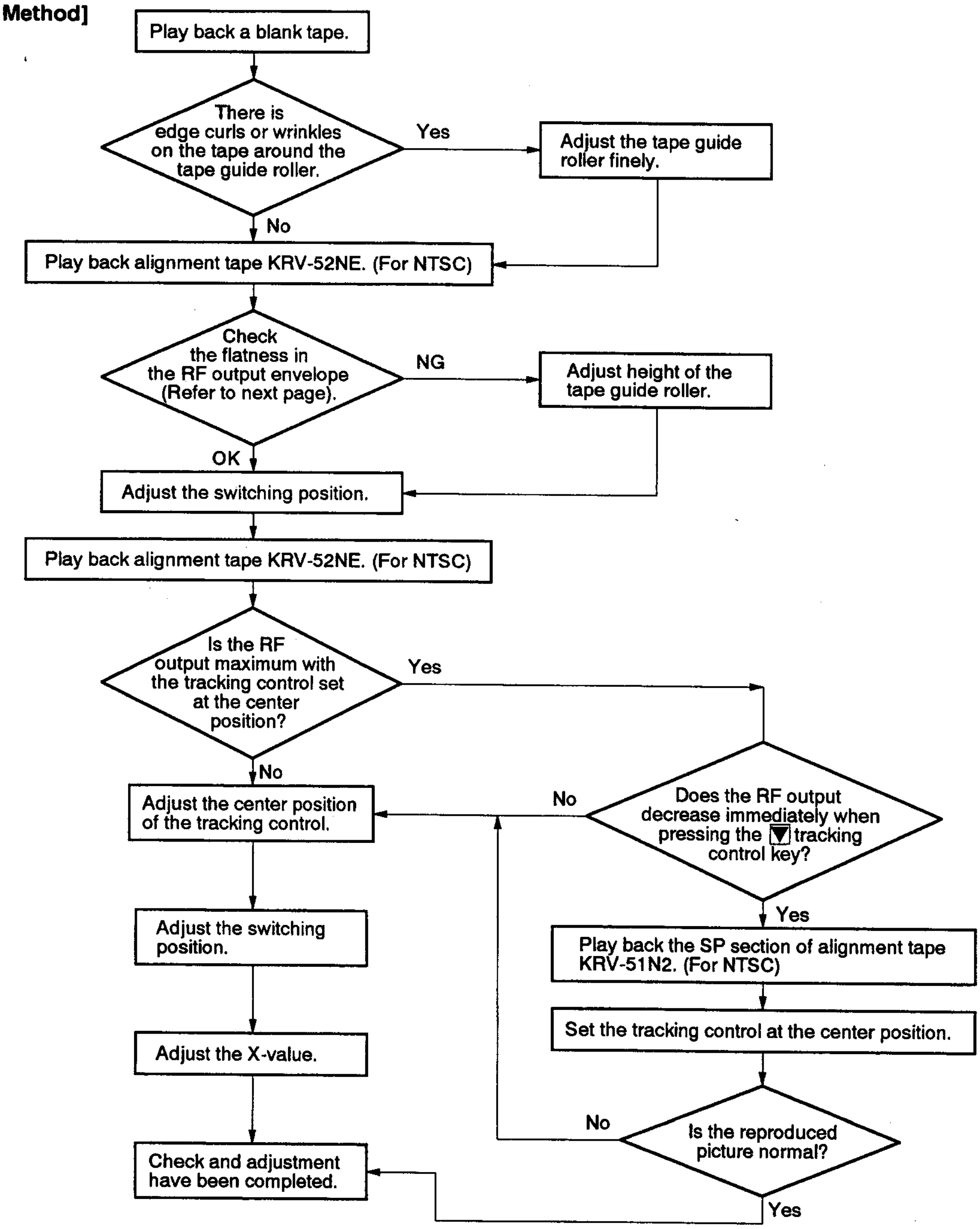
Purpose: Co-relative height, X-value and other factors of the drum will deviate from those of the guide roller. If the drum is replaced properly, these deviations are extremely small.

Note 1: Deactivate the automatic tracking control for setting the mechanism in manual tracking control mode.

Note 2: To set the tracking control at the center position, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

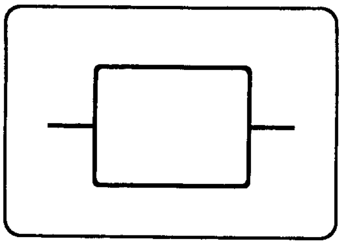
Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC), blank tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SWP pin for RF PC board check.
Adjustment locations	Guide roller (Refer to 2-3-1.) Switching position (Refer to the Service Manual) X-value (Refer to 2-1-1, 2-1-2.)

[Adjustment Method]

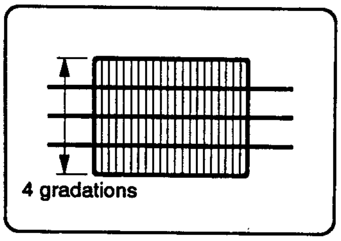

Play back a blank tape.
There is edge curls or wrinkles on the tape around the tape guide roller.
Yes
Adjust the tape guide roller finely.
No
Play back alignment tape KRV-52NE. (For NTSC)
Check the flatness in the RF output envelope (Refer to next page).
NG
Adjust height of the tape guide roller.
OK
Adjust the switching position.
Play back alignment tape KRV-52NE. (For NTSC)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Adjust the center position of the tracking control.
No
Does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Set the tracking control at the center position.
No
Is the reproduced picture normal?
Yes
Adjust the switching position.
Adjust the X-value.
Check and adjustment have been completed.

[Checking the evenness and fluctuation of the RF output]

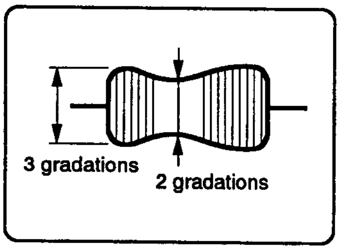
1) Set the RF output to the maximum level using the tracking buttons.



2) Perform fine adjustment of the voltage level range of the oscilloscope, then adjust the RF output deviation to within 4 gradations.



3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 3 gradations.
4) At this time, check if the minimum amplitude is more than 2 gradations.



5) Check that the RF output fluctuation between minimum and maximum levels is within 13%.

Sony Corporation
Consumer A&V Products Company
Home A&V Products Div.

9-973-623-82

Published by Personal A&V Products Div.
Quality Engineering Dept.

VHS MECHANICAL ADJUSTMENT MANUAL IV

SONY®
SERVICE MANUAL

H MECHANISM

SUPPLEMENT-2

File this supplement with the VHS mechanical adjustment IV and supplement-1.

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1. CORRECTION

In the VHS Mechanism Adjustment Manual IV (Supplement-1), an adjustment sequence was wrong, and it is corrected as follow;

1-1. Adjustment Sequence (VHS Mechanism Adjustment Manual IV (Supplement-1) Page 6 to 11)

(1) Adjustment of No. 3 and No. 6 guide roller height
Delete the "The following adjustment shall be carried out after completed Section 2-1-1 "X-value adjustment and check" under "Adjustment Method" on page 10.

(2) Adjustment of ACE head assembly

Note: In the adjustment of ACE head assembly (coarse adjustment and fine adjustment), if a azimuth, height and tilt were adjusted, again adjust the height of No. 3 and No. 6 guide rollers.

(3) Adjustment of X value

MICROFILM

2. MODIFICATION

2-1. CHANGING THE RECORDED CONTENTS OF ALIGNMENT TAPE

KRV-52NE (NTSC) (Ver. 1.2)

Time	Video	Audio
20 min.	Recording only at 1 MHz, A-ch. EP mode RF skipping once per 5 frames	5 kHz → 4 kHz full tracks

2-2. TG2 ROLLER, FE HEAD ASSEMBLY (Refer to VHS Mechanical Adjustment Manual Ⅳ page14)

- The TG2 roller is provided with either of two types, fixed or straight. For the fixed type, section 3-5 is added.

3-5. TG2 ROLLER, FE HEAD ASSEMBLY (Fig. 3-5)

1) Remove screw ① to pull out FE head assembly ②.

[Note on Mounting]

- Keep clean the surface contacts tape of TG2 roller.

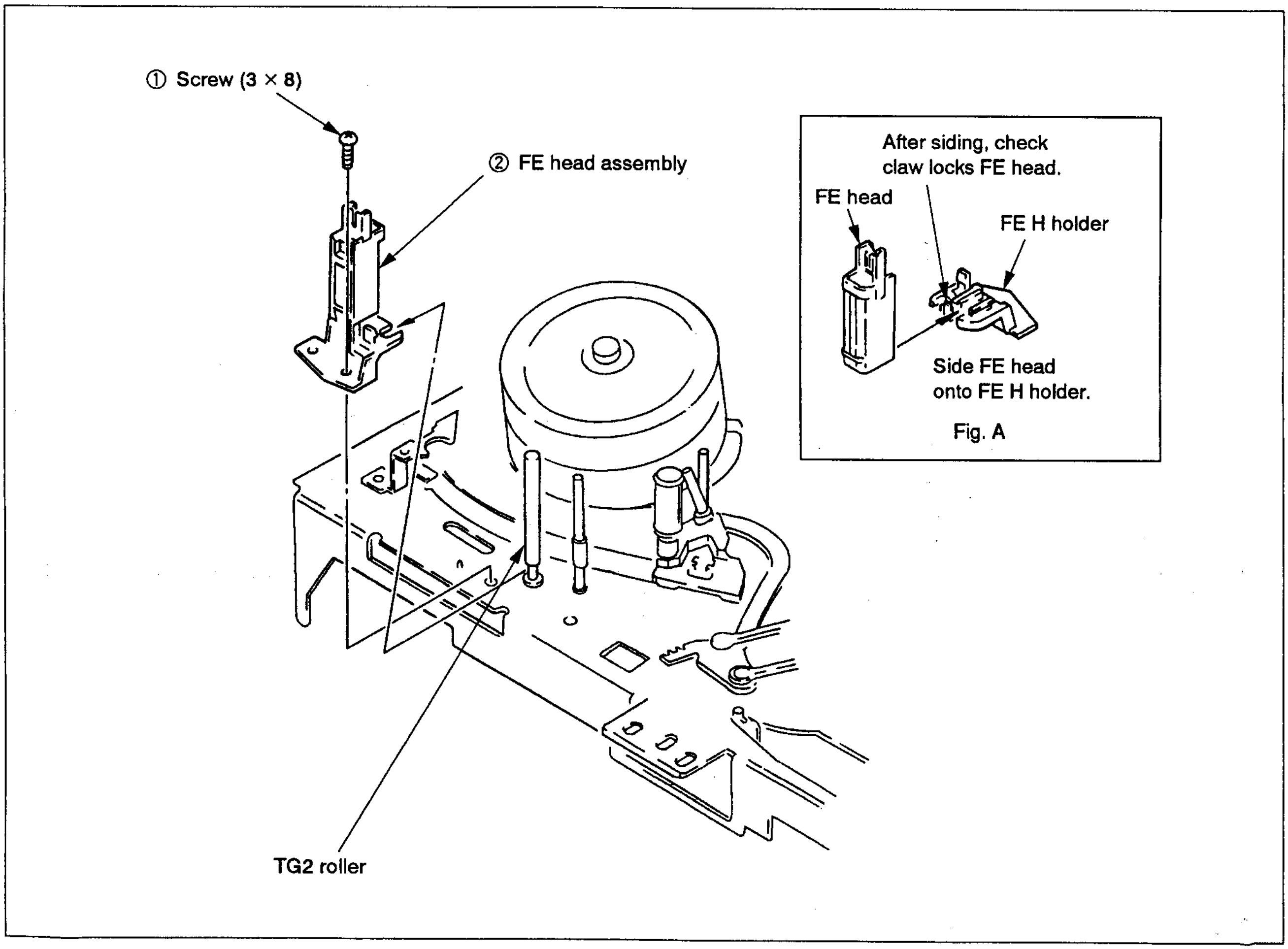

① Screw (3 × 8)
② FE head assembly
TG2 roller
After siding, check claw locks FE head.
FE head
FE H holder
Side FE head onto FE H holder.
Fig. A

Fig. 3-5

2-3. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual IV page 17)

- There is another type in TG3 and TG6 guide roller assemblies, which is not attached with a screw (B2X3). For the screwless type, section 3-8 is added.

3-8. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Fig. 3-8)

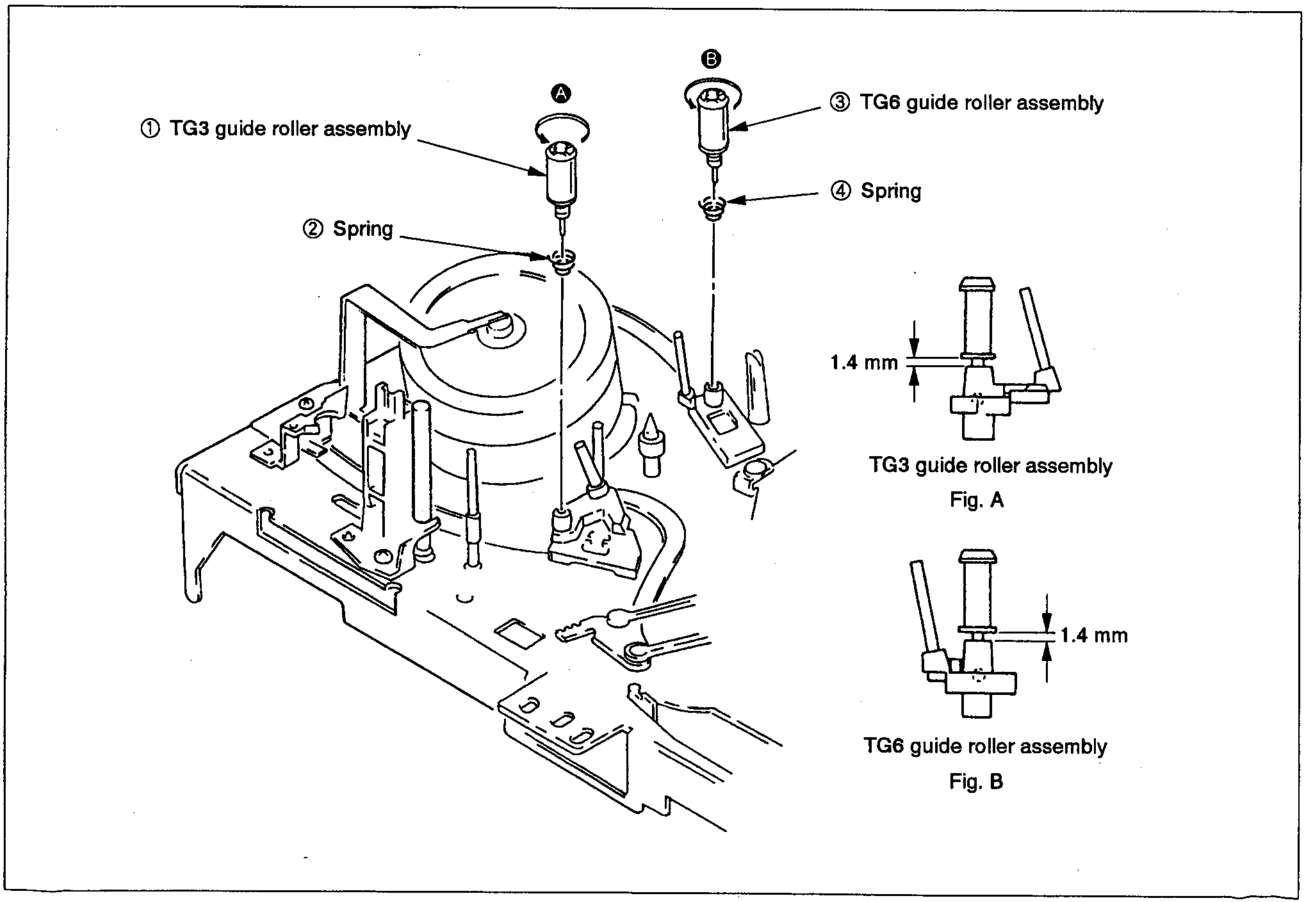
1) TG3 guide roller assembly ① by turning it in arrow Ⓐ direction.
2) Removal the spring ②.
3) TG6 guide roller assembly ③ by turning it in arrow Ⓑ direction.
4) Removal the spring ④.

[Note on Mounting]

- Keep clean the surface contacts tape of TG3 and TG6 guide roller assemblies ①, ③.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.


Ⓑ
Ⓐ
③ TG6 guide roller assembly
① TG3 guide roller assembly
④ Spring
② Spring
1.4 mm
1.4 mm

TG3 guide roller assembly
Fig. A

TG6 guide roller assembly
Fig. B

Fig. 3-8

2-4. TG8 ASSEMBLY (Refer to VHS Mechanical Adjustment Manual Ⅳ page 23)

- As the shape of TG8 assembly was changed, Section 3-13 is changed.

☛ : Chenged portion

3-13. TG8 ASSEMBLY (Fig. 3-15)

1) Remove TG7 tape retainer ① to pull out TG8 assembly ②.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portion.
- Keep clean the surface contacts tape of TG8 assembly ②.
- Be careful not to change the shape of TG7 tape retainer ①.
- After attaching the TG7 tape retainer ①, check that side Ⓐ of ① is below side Ⓑ of the stepped-part of the TG7 shaft. (Fig. A)

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

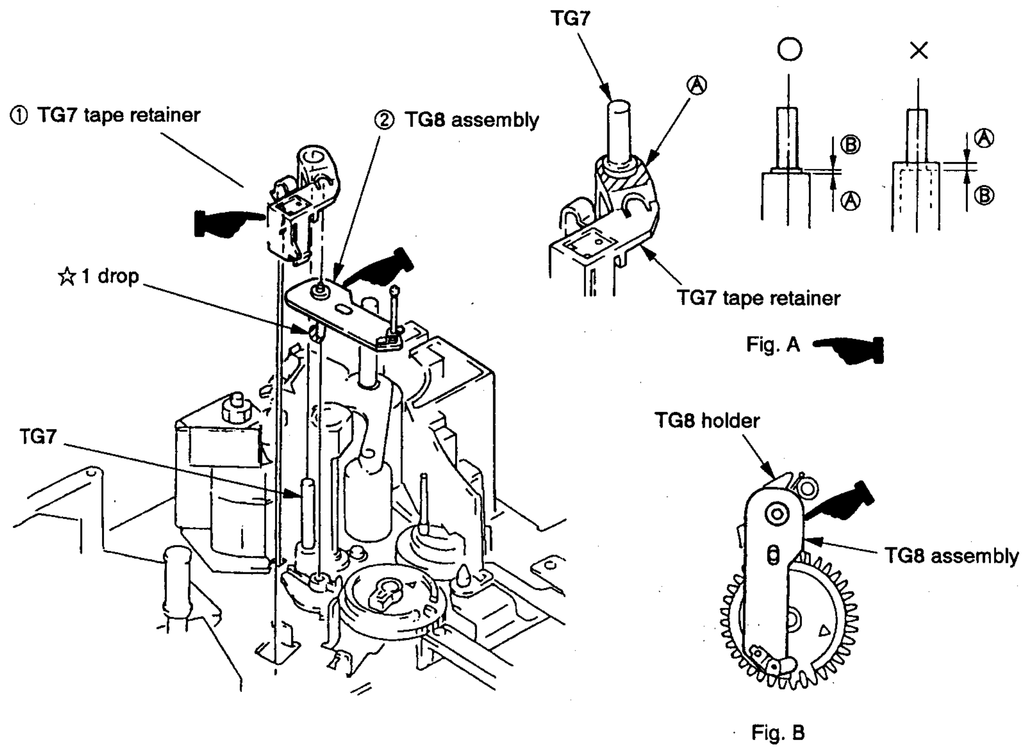

① TG7 tape retainer
② TG8 assembly
☆1 drop
TG7
TG7
Ⓐ
○
×
Ⓑ
Ⓐ
Ⓐ
Ⓑ
TG7 tape retainer
Fig. A
TG8 holder
TG8 assembly
Fig. B

Fig. 3-15

2-5. TENSION REGULATOR (TG1) POSITION/ TENSION ADJUSTMENT (Refer to VHS Mechanical Adjustment Manual Ⅳ page 35)

- As the tension regulator position and tension adjustment were changed, the tension adjustment and Fig. 4-1 are changed.

☛ : Changed portion

• Tension adjustment

Mode	Playback
Measuring instrument/tool	Torque cassette
Adjustment locations	Position for hooking the tension spring
Specified value	34 ± 4 g•cm ☛

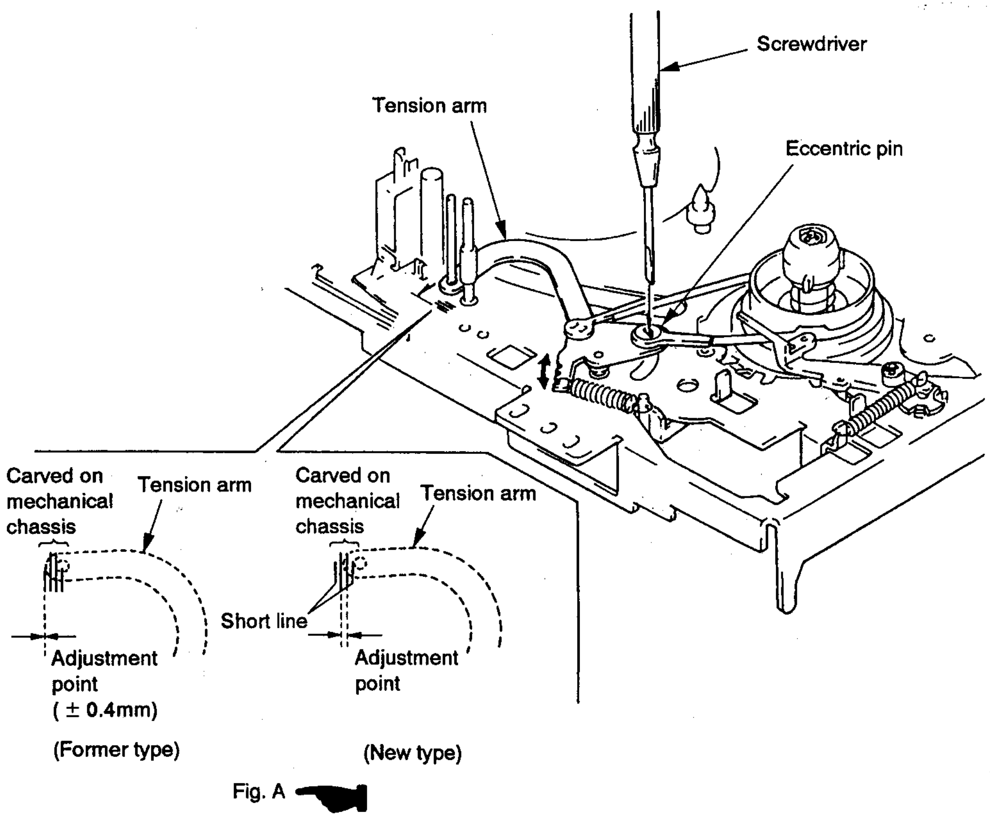

Screwdriver
Tension arm
Eccentric pin
Carved on mechanical chassis
Tension arm
Adjustment point
(± 0.4mm)
(Former type)
Carved on mechanical chassis
Tension arm
Short line
Adjustment point
(New type)
Fig. A

Fig. 4-1

2-6. TG8 GUIDE ROLLER HEIGHT ADJUSTMENT (Refer to VHS Mechanical Adjustment Manual Ⅳ page 36)

- As the use of TG8 height adjusting screw was cancelled, section 4-1-2 is changed.

4-1-2. TG7 TAPE PATH ADJUSTMENT (Fig. 4-2)

[Adjustment Method]

1) Load a tape, and playback the tape in the CUE mode, confirm the distance between lower flange of No. 7 guide roller and lower side of tape (Fig. A).
2) Then, feeding the tape in the REV mode, confirm the distance between lower flange of No. 7 guide roller and lower side of tape.
3) If the tape height in the REV feed is higher that in the CUE playback (Fig. B), rotate the ACE head flapping adjust screw in the direction Ⓐ so that a difference in tape height between CUE mode and REV mode becomes zero.
4) If the tape height in the REV feed is lower that in the CUE playback (Fig. C), rotate the ACE head flapping adjust screw in the direction Ⓑ so that a difference in tape height between CUE mode and REV mode becomes zero.

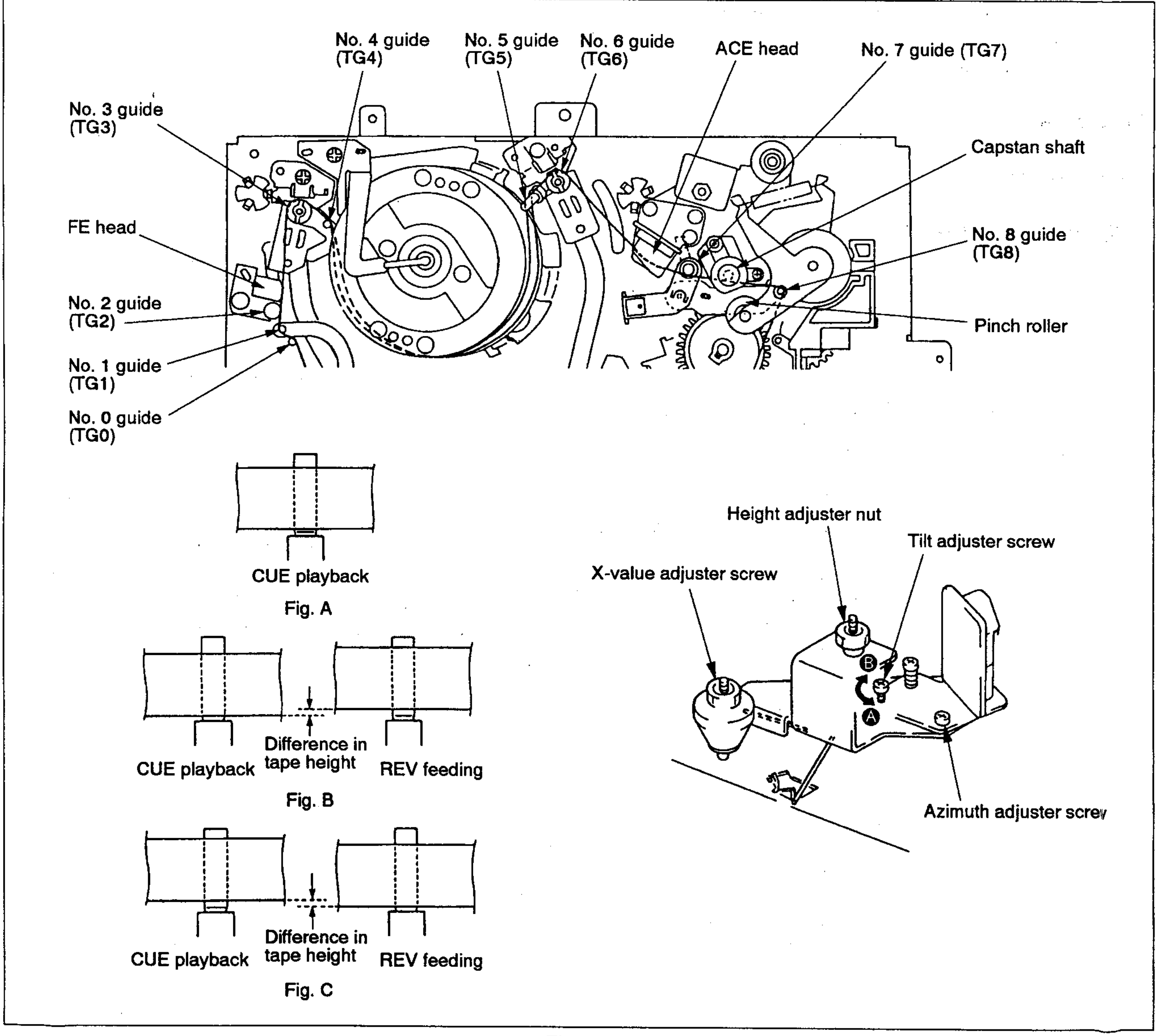

No. 4 guide (TG4)
No. 5 guide (TG5)
No. 6 guide (TG6)
ACE head
No. 7 guide (TG7)
No. 3 guide (TG3)
Capstan shaft
FE head
No. 8 guide (TG8)
No. 2 guide (TG2)
Pinch roller
No. 1 guide (TG1)
No. 0 guide (TG0)
CUE playback
Height adjuster nut
Tilt adjuster screw
X-value adjuster screw
B
A
Azimuth adjuster screw
CUE playback
Difference in tape height
REV feeding
CUE playback
Difference in tape height
REV feeding

Fig. A

Fig. B

Fig. C

Fig. 4-2

Sony Corporation
Consumer A&V Products Company
Home A&V Products Div.

Published by Personal A&V Products Div.
Quality Engineering Dept.

VHS MECHANICAL ADJUSTMENT MANUAL IV

SONY

H MECHANISM

SERVICE MANUAL

SUPPLEMENT-3

File this supplement with the VHS mechanical adjustment IV and supplement-1, 2.

**Subject: Mechanism chassis assembly changed.
PAL alignment tape changed.**

(SL-600060)

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1. MODIFICATION

1-1. PARTS REQUIRING CLEANING (Refer to VHS Mechanical Adjustment Manual IV page 7)

- Parts requiring a cleaning were changed in shape, and therefore, Fig. 2-1 for new type is added.

☛: **Modificated portion**

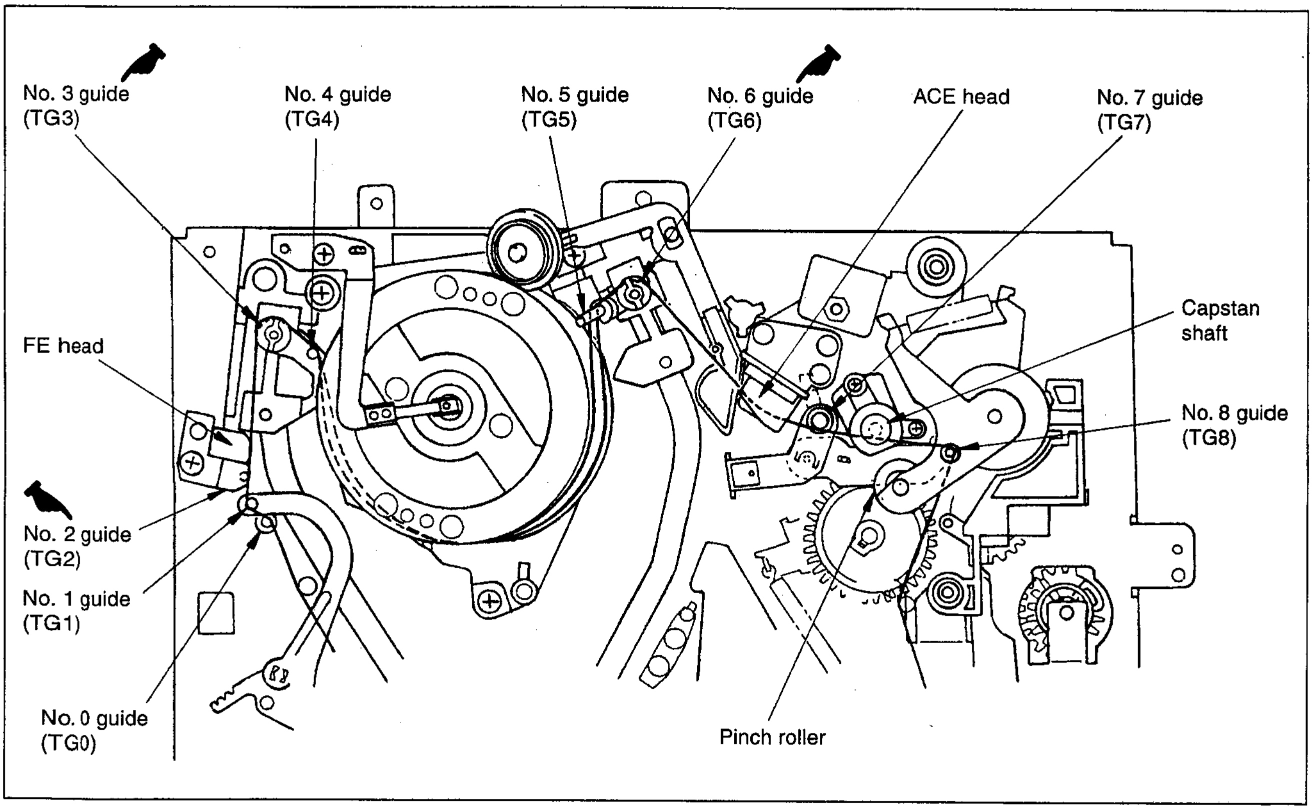

No. 3 guide (TG3)
No. 4 guide (TG4)
No. 5 guide (TG5)
No. 6 guide (TG6)
ACE head
No. 7 guide (TG7)
Capstan shaft
FE head
No. 8 guide (TG8)
No. 2 guide (TG2)
No. 1 guide (TG1)
No. 0 guide (TG0)
Pinch roller

Fig. 2-1 Parts Requiring Cleaning

1-2. DRUM ASSEMBLY, DRUM BASE (Refer to VHS Mechanical Adjustment Manual IV page 11)

- The ground shaft assembly was changed and the drum base was added, and therefore Section 3-2 for new type is added.

3-2. DRUM ASSEMBLY, DRUM BASE (Fig. 3-2)

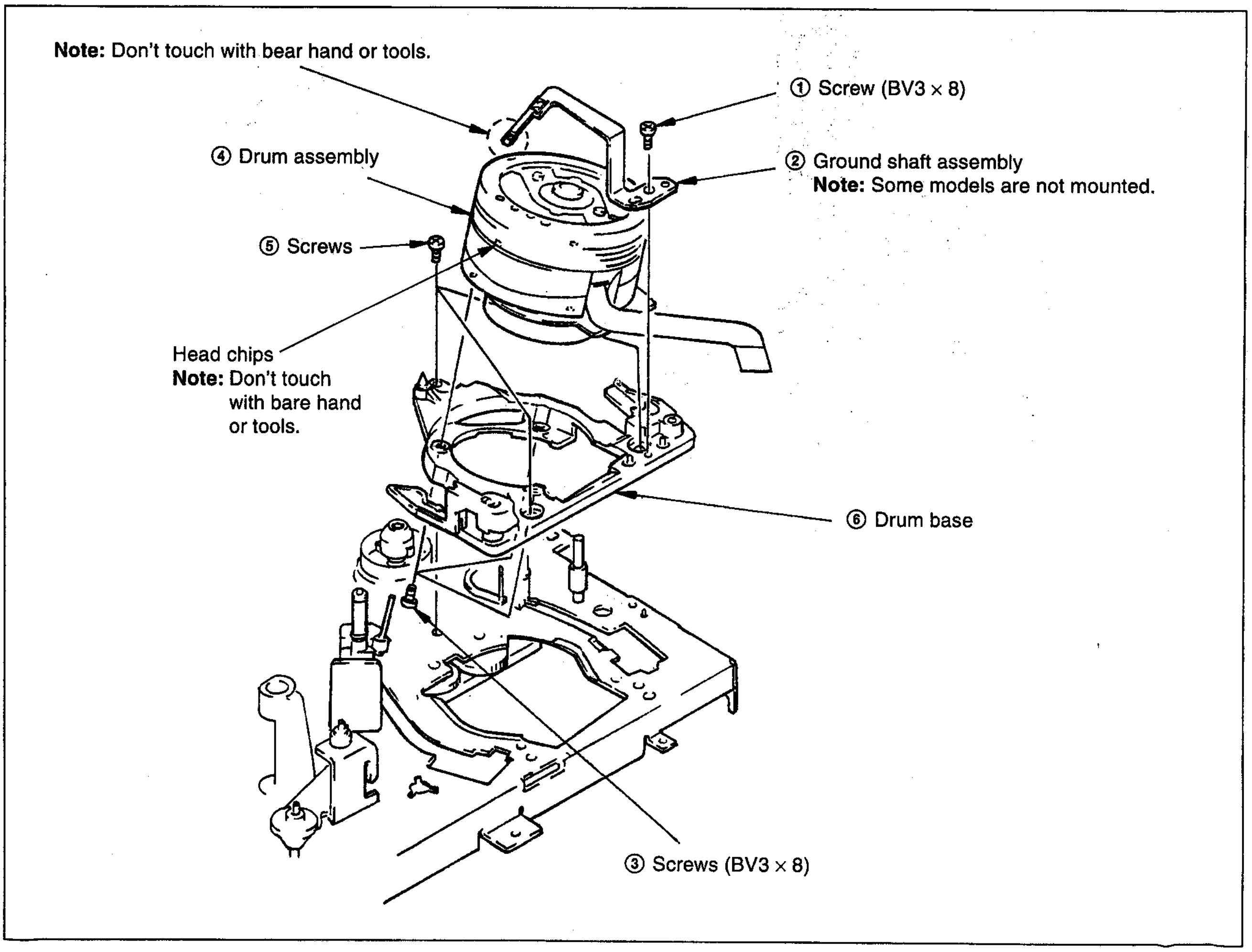
1) Remove screw ①.
2) Remove ground shaft assembly ② not to touch its tip with bare hand or tools.
3) Remove screws ③ to remove drum assembly ④.
4) Remove screws ⑤ to remove drum base ⑥.

[Note on Mounting]

- Don't touch head chips and ground shaft assembly ④ with bare hand or tools.
- Keep clean the surface contacts tape of drum assembly ④.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.



Note: Don't touch with bear hand or tools.
① Screw (BV3 x 8)
④ Drum assembly
② Ground shaft assembly
Note: Some models are not mounted.
⑤ Screws
Head chips
Note: Don't touch with bare hand or tools.
⑥ Drum base
③ Screws (BV3 x 8)

Fig. 3-2

1-3. TG2 ROLLER, FE HEAD ASSEMBLY (Refer to VHS Mechanical Adjustment Manual IV page 14)

- The TG2 roller was assembled in the FE head assembly, and therefore Section 3-5 for new type is added.

3-5. TG2 ROLLER, FE HEAD ASSEMBLY (Fig. 3-5)

1) Remove screw ①.
2) Pull out FE head assembly ②.

[Note on Mounting]

- Keep clean the surface contacts tape of TG2 roller.

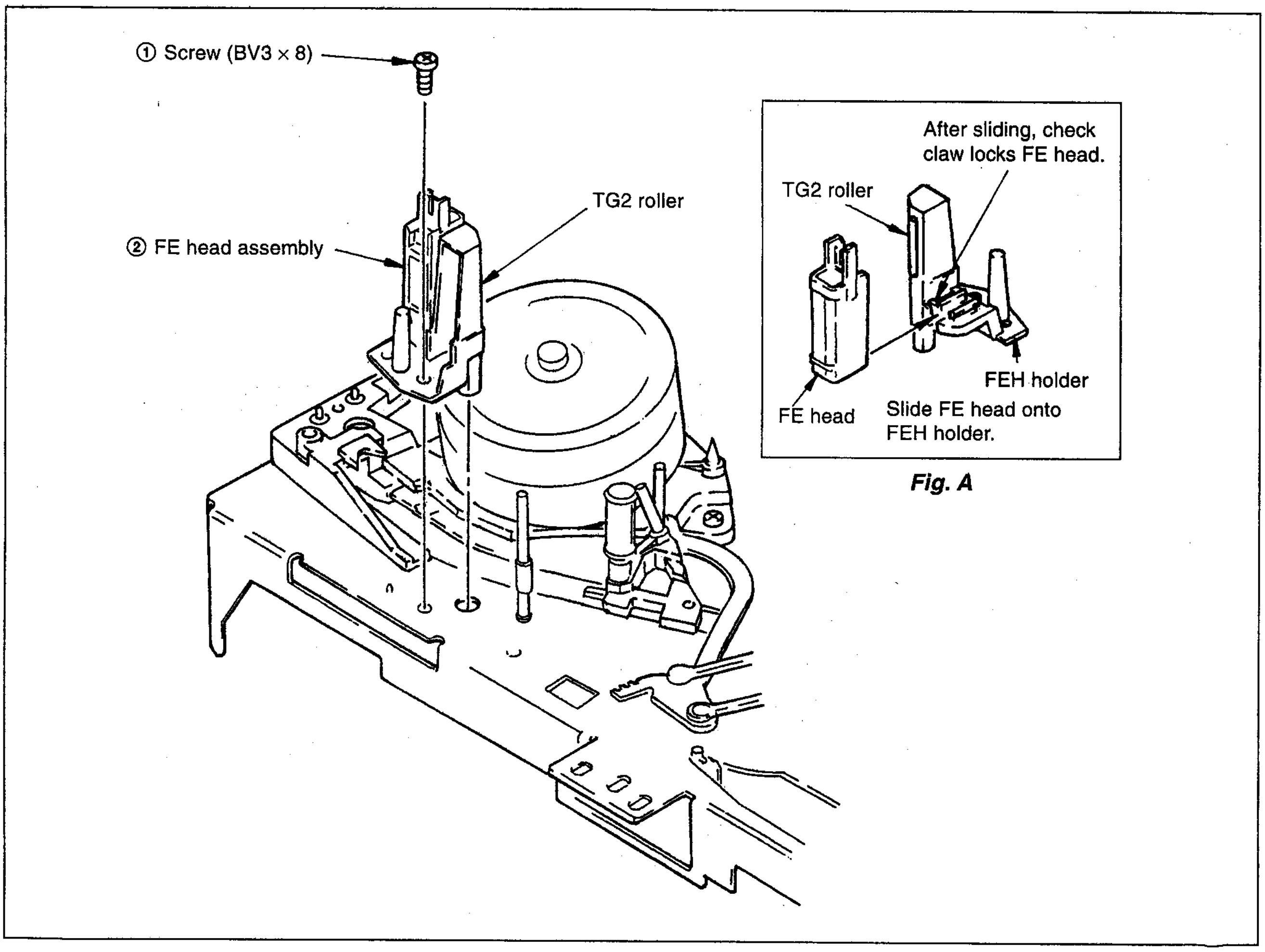

① Screw (BV3 × 8)
② FE head assembly
TG2 roller
After sliding, check claw locks FE head.
TG2 roller
FEH holder
FE head
Slide FE head onto FEH holder.
Fig. A

Fig. 3-5

1-4. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual IV page 17)

- The TG3 and TG6 guide roller assemblies were changed, and therefore Section 3-8 for new type is added.

3-8. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Fig. 3-8)

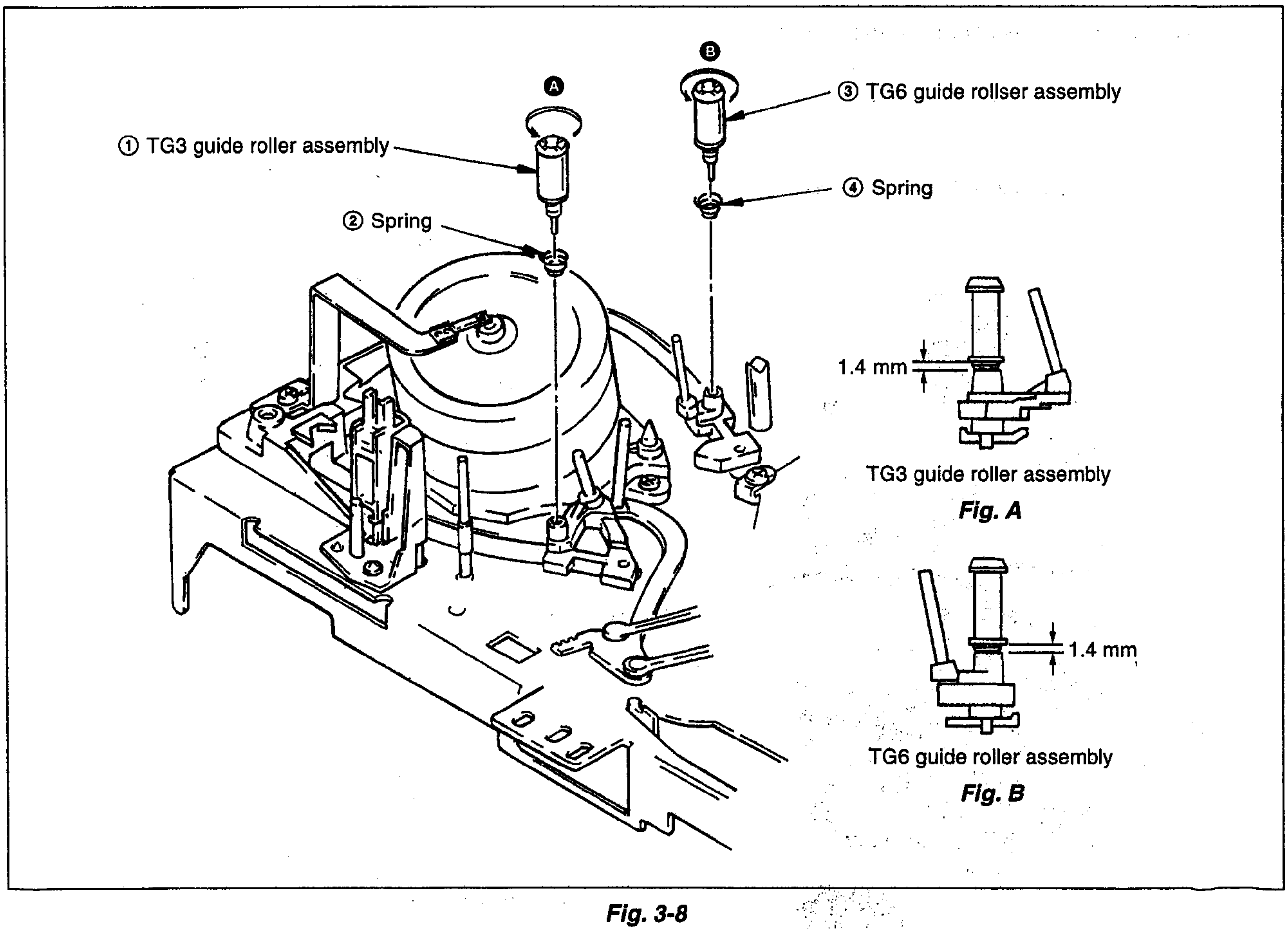
1) TG3 guide roller assembly ① by turning it in the arrow 🅐 direction.
2) Removal the spring ②.
3) TG6 guide roller assembly ③ by turning it in the arrow 🅑 direction.
4) Removal the spring ④.

[Note on Mounting]

- Keep clean the surface contacts tape of TG3 and TG6 guide roller assemblies ①, ③.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.


🅐
🅑
① TG3 guide roller assembly
② Spring
③ TG6 guide rollser assembly
④ Spring
1.4 mm
1.4 mm

TG3 guide roller assembly

Fig. A

TG6 guide roller assembly

Fig. B

Fig. 3-8

1-5. SHUTTLE T BLOCK AND LOADING GEAR T BLOCK ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual IV page 29)

- The shuttle T block and loading gear T block assemblies were changed, and therefore Section 3-19 for new type is added.

3-19. SHUTTLE T BLOCK AND LOADING GEAR T BLOCK ASSEMBLIES (Fig. 3-21)

1) Remove drum assembly and drum base. (Refer to 3-2.)
2) Remove timing belt. (Refer to 3-3.)
3) Remove CAP brake assembly. (Refer to 3-4.)
4) Remove cam motor chassis block assembly. (Refer to 3-18.)
5) Remove main slider. (Refer to 3-20.)
6) Sliding the shuttle T block assembly ① toward the direction Ⓐ, remove it through the hole Ⓑ.
7) Pull out loading gear T block assembly ②.

[Note on Mounting]

- Adjust the phase Ⓒ between loading gear (T) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle T block assembly ①.

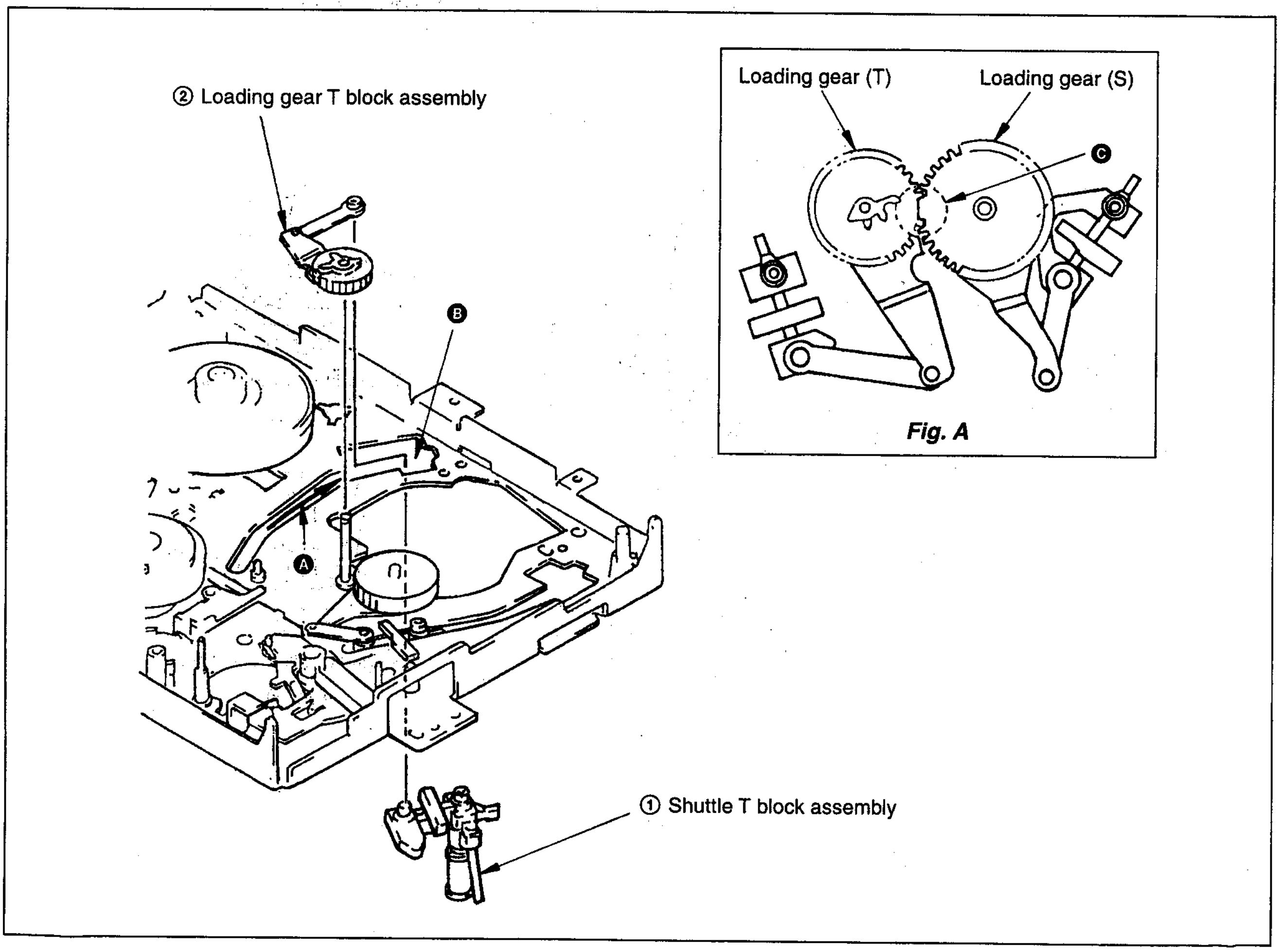

② Loading gear T block assembly
Ⓑ
Ⓐ
① Shuttle T block assembly
Loading gear (T)
Loading gear (S)
Ⓒ
Fig. A

Fig. 3-21

1-6. SHUTTLE S BLOCK AND LOADING GEAR S BLOCK ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual IV page 30)

- The shuttle S block and loading gear S block assemblies were changed, and therefore Section 3-20 for new type is added.

3-20. SHUTTLE S BLOCK AND LOADING GEAR S BLOCK ASSEMBLIES (Fig. 3-22)

1) Remove drum assembly and drum base. (Refer to 3-2.)
2) Remove timing belt. (Refer to 3-3.)
3) Remove CAP brake assembly. (Refer to 3-4.)
4) Remove cam motor chassis block assembly. (Refer to 3-18.)
5) Remove main slider. (Refer to 3-20.)
6) Sliding the shuttle S block assembly ① toward the direction Ⓐ, remove it through the hole Ⓑ.
7) Pull out loading gear S block assembly ②.

[Note on Mounting]

- Adjust the phase Ⓒ between loading gear (S) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle S block assembly ①.

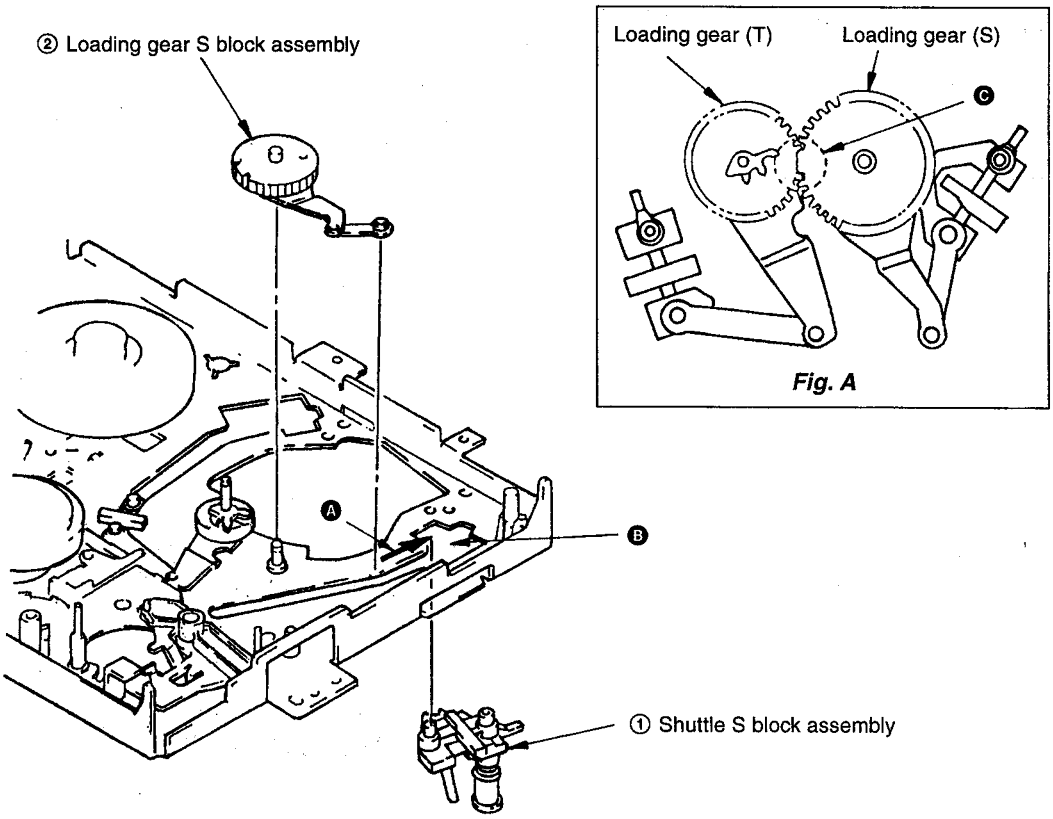

② Loading gear S block assembly
Loading gear (T)
Loading gear (S)
Ⓒ
Fig. A
Ⓐ
Ⓑ
① Shuttle S block assembly

Fig. 3-22

2. ADJUSTING THE MECHANISM USING NEW ALIGNMENT TAPE (KRV-52PL for PAL)

The conventional alignment tape (For PAL) is now replaced with alignment tape KRV-52PL, and the following describes how to align the mechanism using the KRV-52PL. For details on the use of KRV-51P for each model, refer to the service manuals which will be issued in the future.

Name	Parts No.	Remarks
Alignment tape KRV-52PL for PAL	8-192-605-46	For tape path, audio azimuth, and X-value adjustments
Alignment tape KRV-51P for PAL	8-192-605-36	For electrical adjustments (RF, AF, and switching position) and operation check

Contents:

KRV-52PL (PAL)

Time	Video	Audio
20 min.	Recording only at 1 MHz, A-ch. EP mode RF skipping once per 5 frames	4 kHz full tracks

KRV-51P (PAL)

Class	Mode	Time	Video	Audio (HiFi/Normal)
1	SP	7 min.	Color bar	400 Hz
2	SP	3 min.	Mono. scope	400 Hz
3	EP	7 min.	Color bar	400 Hz
4	EP	3 min.	Mono. scope	400 Hz

2-1. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6

Mode	Playback
Signal	Alignment tape KRV-52PL (For PAL)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	Height adjustment screw for No. 3 tape guide roller Height adjustment screw for No. 6 tape guide roller

[Adjustment Method]

1) Deactivate the automatic tracking control, and set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).
2) Turn the height adjustment screws of tape guide rollers No. 3 and No. 6 so that the RF output envelope becomes as flat as possible.
3) Press the ▲ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
4) Press the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.

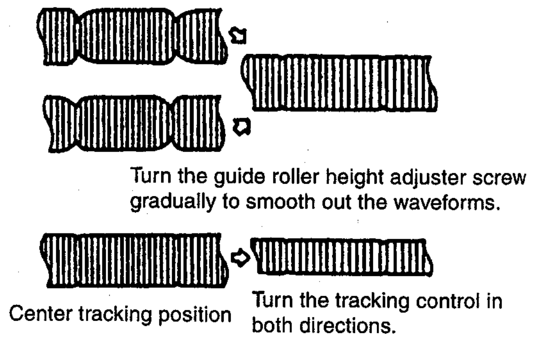

Turn the guide roller height adjuster screw gradually to smooth out the waveforms.
Center tracking position
Turn the tracking control in both directions.

Fig. 2-1

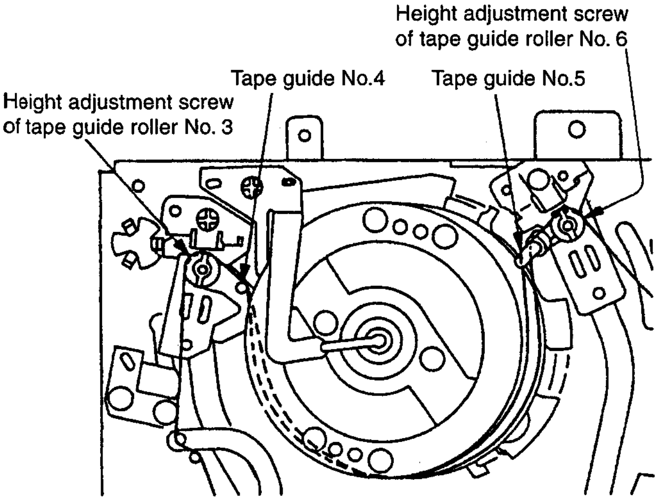

Height adjustment screw of tape guide roller No. 6
Tape guide No.4
Tape guide No.5
Height adjustment screw of tape guide roller No. 3

Fig. 2-2

2-2. ACE HEAD ASSEMBLY ADJUSTMENT (ROUGH ADJUSTMENT)
(Figs. 2-3 and 2-4)

Purpose: Allows the tape to make even contract with the head for recording and playback of the specified track.

Mode	Playback
Jig	Blank tape
Adjustment locations	Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Mount the ACE head assembly. AT this time, adjust the height so that the height of guide flange No. 7 matches the level of the lower edge of the control head.
2) Remove the adjustment tool and load a new tape, then set the unit for playback.
3) Check that the tape does not curl or rise up noticeably near the ACE head.
4) If the tape curls up or rises noticeably, readjust the tilt adjuster screw and the height adjuster nut.
(The height of the ACE head should be adjusted so that the lower edge of the tape is approx. 0.1 to 0.15 mm from the control head.)
5) Perform precision adjustment.

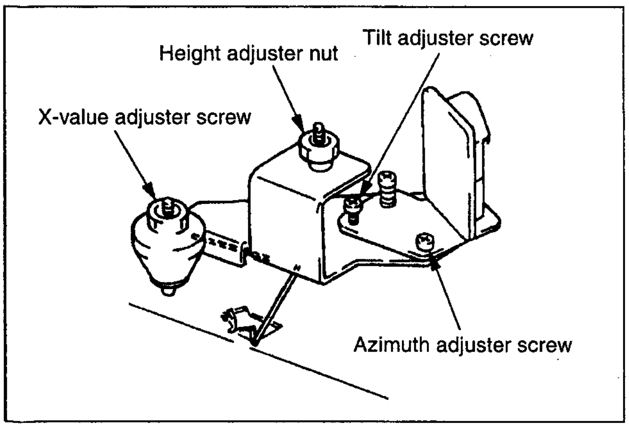

Height adjuster nut
Tilt adjuster screw
X-value adjuster screw
Azimuth adjuster screw

Fig. 2-3

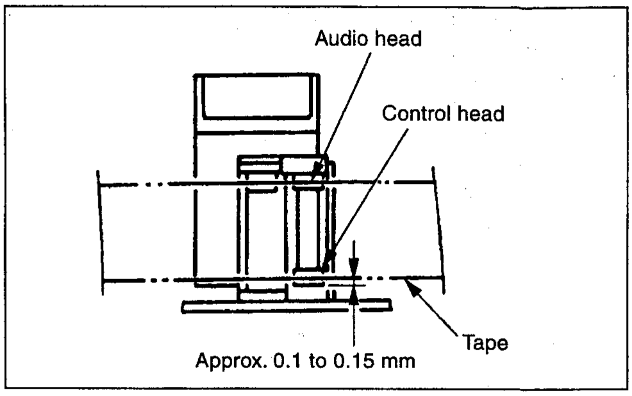

Audio head
Control head
Tape
Approx. 0.1 to 0.15 mm

Fig. 2-4

2-3. ACE HEAD ASSEMBLY ADJUSTMENT (PRECISION ADJUSTMENT)

Mode	Playback
Signal	Alignment tape (KRV-52PL 4 kHz) (For PAL)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Adjust the tilt adjuster screw in the FWD or REV mode so that the lower flange of guide No. 7 does not curl up or rise.
2) Alternately adjust the azimuth adjuster screw, the height adjuster nut, and the tilt adjuster screw to maintain even audio output at maximum with minimum deviation.

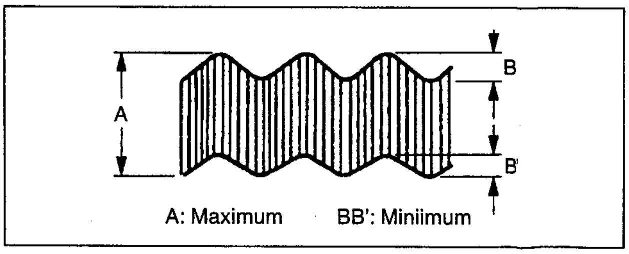

A
B
B'
A: Maximum
BB': Miniimum

Fig. 2-5

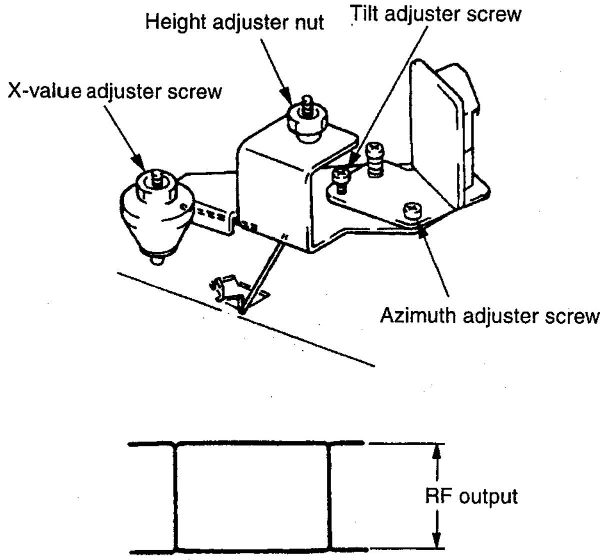
Note: In the adjustment of ACE head assembly (coarse adjustment and fine adjustment), if a azimuth, height and tilt were adjusted, again adjust the height of No. 3 and No. 6 guide rollers.

2-4. X-VALUE ADJUSTMENT

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52PL
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	X-value adjuster screw



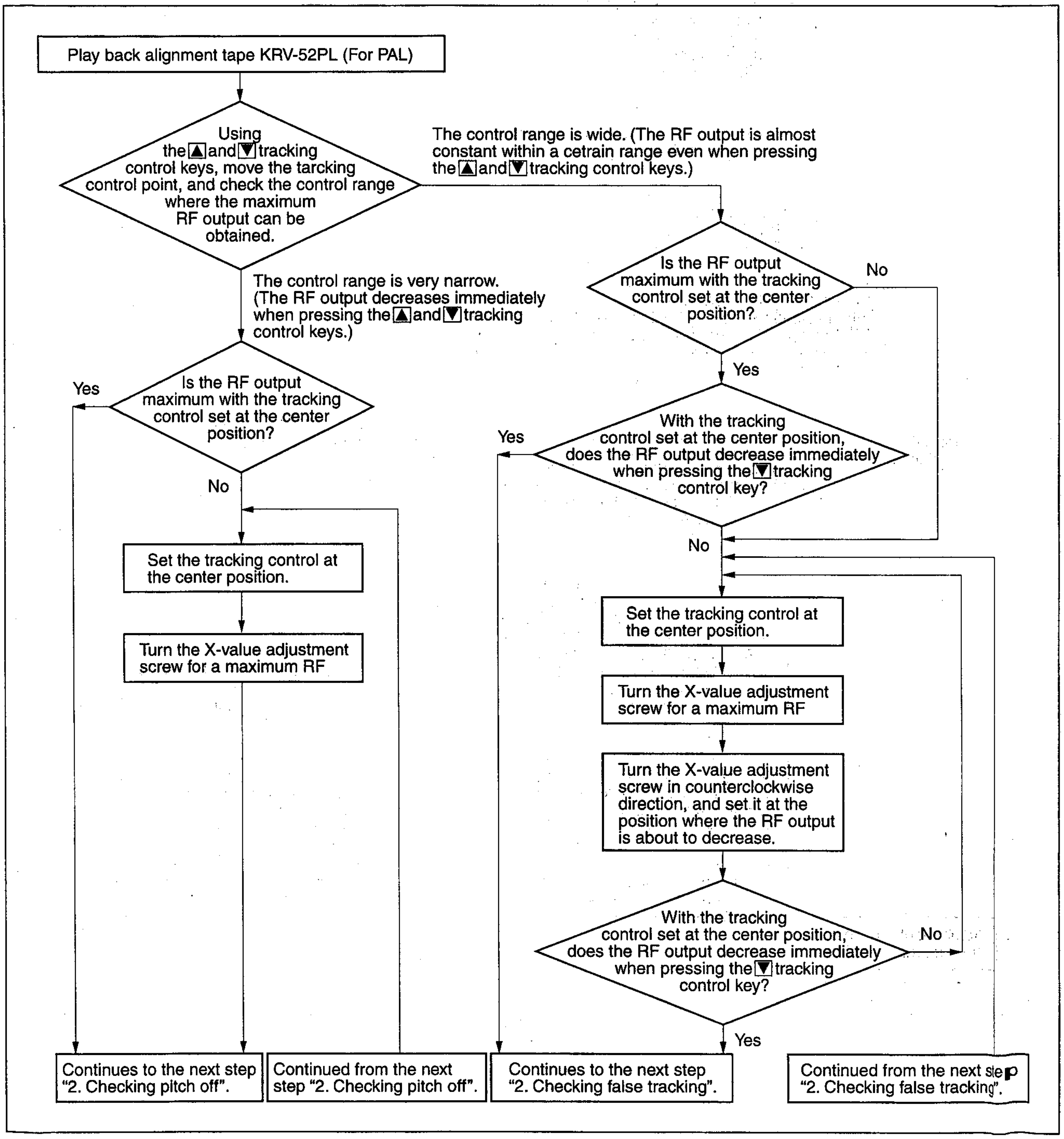
RF output shall be maximum at the center position of the tracking control.

Fig. 2-6

[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with narrow gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

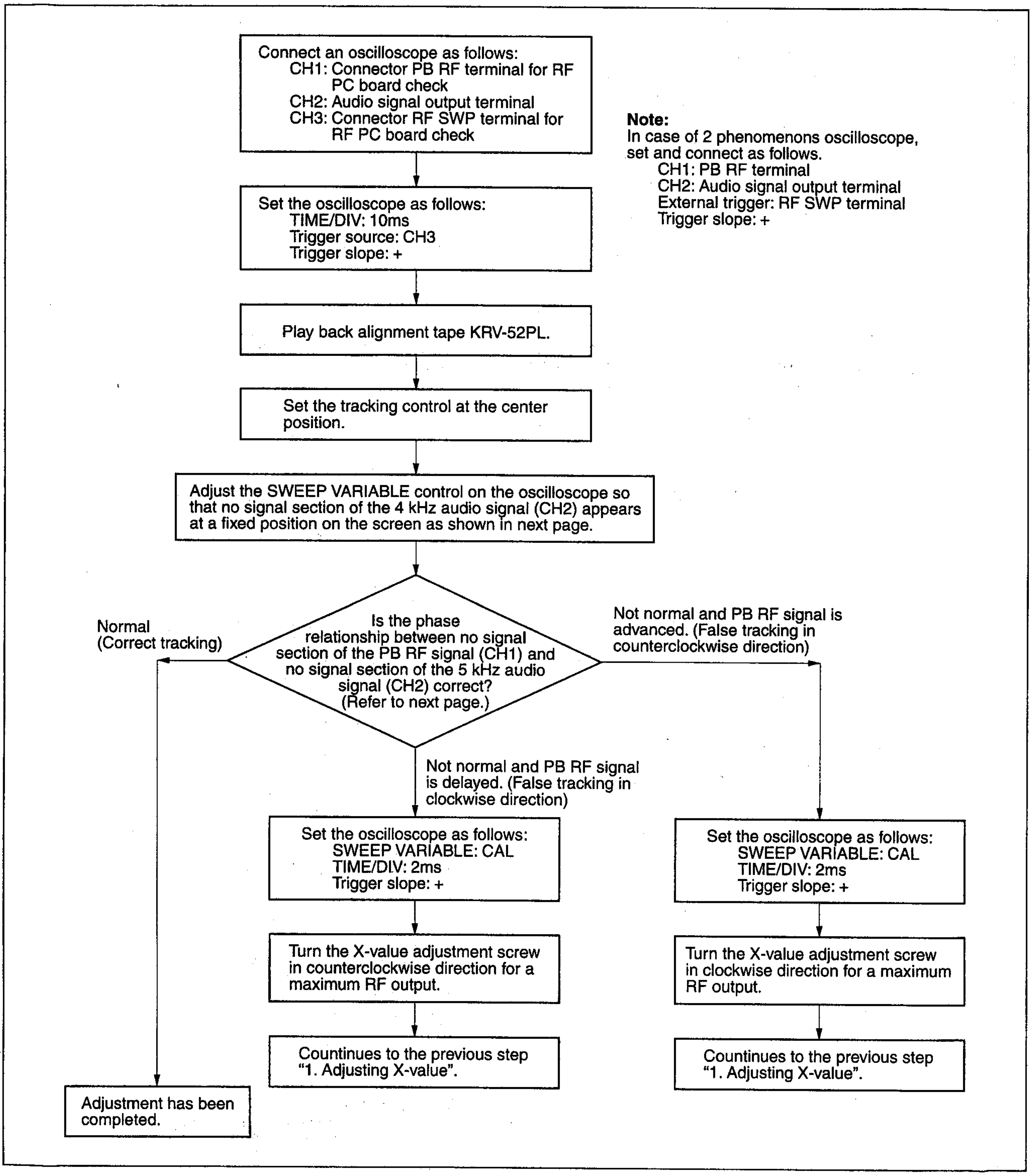
1. Adjusting X-value



Play back alignment tape KRV-52PL (For PAL)
Using the ▲ and ▼ tracking control keys, move the tarcking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a cetrain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Turn the X-value adjustment screw in counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Continues to the next step "2. Checking pitch off".
Continued from the next step "2. Checking pitch off".
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

Fig. 2-7

2. Checking false tracking


Connect an oscilloscope as follows:
CH1: Connector PB RF terminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check
Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source: CH3
Trigger slope: +
Play back alignment tape KRV-52PL.
Set the tracking control at the center position.
Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 4 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.
Is the phase relationship between no signal section of the PB RF signal (CH1) and no signal section of the 5 kHz audio signal (CH2) correct? (Refer to next page.)
Normal (Correct tracking)
Not normal and PB RF signal is advanced. (False tracking in counterclockwise direction)
Not normal and PB RF signal is delayed. (False tracking in clockwise direction)
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjustment screw in counterclockwise direction for a maximum RF output.
Countinues to the previous step "1. Adjusting X-value".
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjustment screw in clockwise direction for a maximum RF output.
Countinues to the previous step "1. Adjusting X-value".
Adjustment has been completed.

Note:
In case of 2 phenomenons oscilloscope, set and connect as follows.
CH1: PB RF terminal
CH2: Audio signal output terminal
External trigger: RF SWP terminal
Trigger slope: +

Fig. 2-8

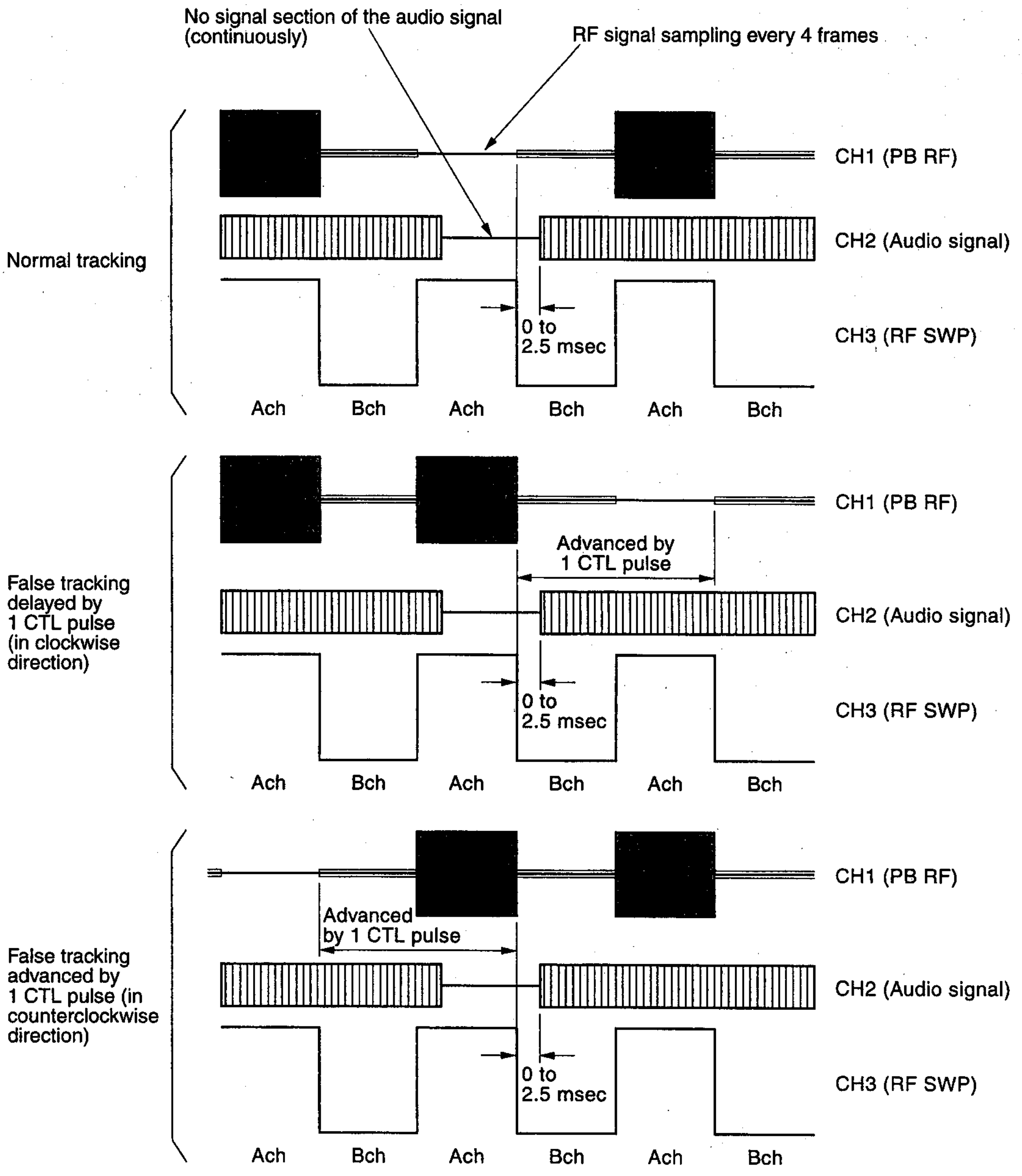

No signal section of the audio signal (continuously)
RF signal sampling every 4 frames
Normal tracking
CH1 (PB RF)
CH2 (Audio signal)
CH3 (RF SWP)
0 to 2.5 msec
Ach
Bch
Ach
Bch
Ach
Bch
False tracking delayed by 1 CTL pulse (in clockwise direction)
Advanced by 1 CTL pulse
CH1 (PB RF)
CH2 (Audio signal)
CH3 (RF SWP)
0 to 2.5 msec
Ach
Bch
Ach
Bch
Ach
Bch
False tracking advanced by 1 CTL pulse (in counterclockwise direction)
Advanced by 1 CTL pulse
CH1 (PB RF)
CH2 (Audio signal)
CH3 (RF SWP)
0 to 2.5 msec
Ach
Bch
Ach
Bch
Ach
Bch

Fig. 2-9

2-5. ADJUSTMENT AFTER REPLACING THE DRUM (VIDEO HEAD)

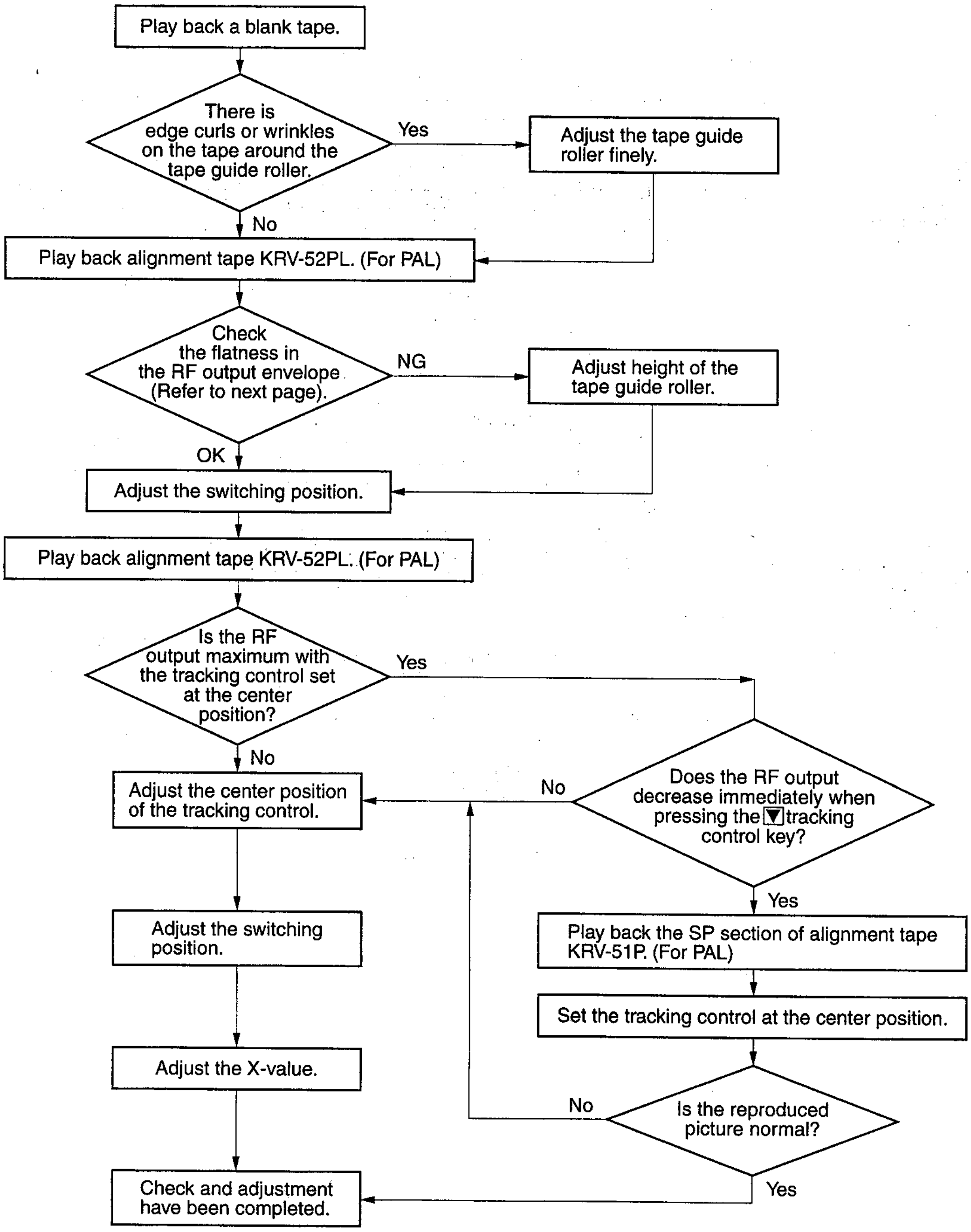
Purpose: Co-relative height, X-value and other factors of the drum will deviate from those of the guide roller. If the drum is replaced properly, these deviations are extremely small.

Note 1: Deactivate the automatic tracking control for setting the mechanism in manual tracking control mode.

Note 2: To set the tracking control at the center position, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52PL (For PAL), blank tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SWP pin for RF PC board check.
Adjustment locations	Guide roller (Refer to 2-1.) Switching position (Refer to the Service Manual) X-value (Refer to 2-3.)

[Adjustment Method]

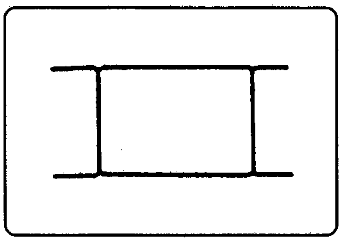


Play back a blank tape.
There is edge curls or wrinkles on the tape around the tape guide roller.
Yes
Adjust the tape guide roller finely.
No
Play back alignment tape KRV-52PL. (For PAL)
Check the flatness in the RF output envelope (Refer to next page).
NG
Adjust height of the tape guide roller.
OK
Adjust the switching position.
Play back alignment tape KRV-52PL. (For PAL)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Adjust the center position of the tracking control.
No
Does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
Play back the SP section of alignment tape KRV-51P. (For PAL)
Set the tracking control at the center position.
Adjust the switching position.
Adjust the X-value.
No
Is the reproduced picture normal?
Yes
Check and adjustment have been completed.

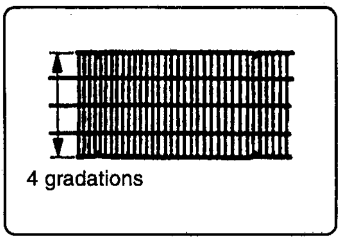
Fig. 2-10

[Checking the evenness and fluctuation of the RF output]

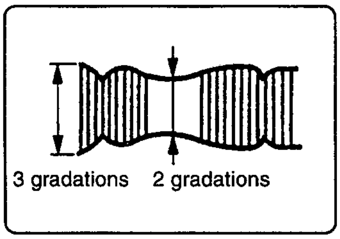
1) Set the RF output to the maximum level using the tracking buttons.



2) Perform fine adjustment of the voltage level range of the oscilloscope, then adjust the RF output deviation to within 4 gradations.



3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 3 gradations.
4) AT this time, check if the minimum amplitude is more than 2 gradations.



5) Check that the RF output fluctuation between minimum and maximum levels is within 13%.

Fig. 2-11

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Home Video Division Company

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